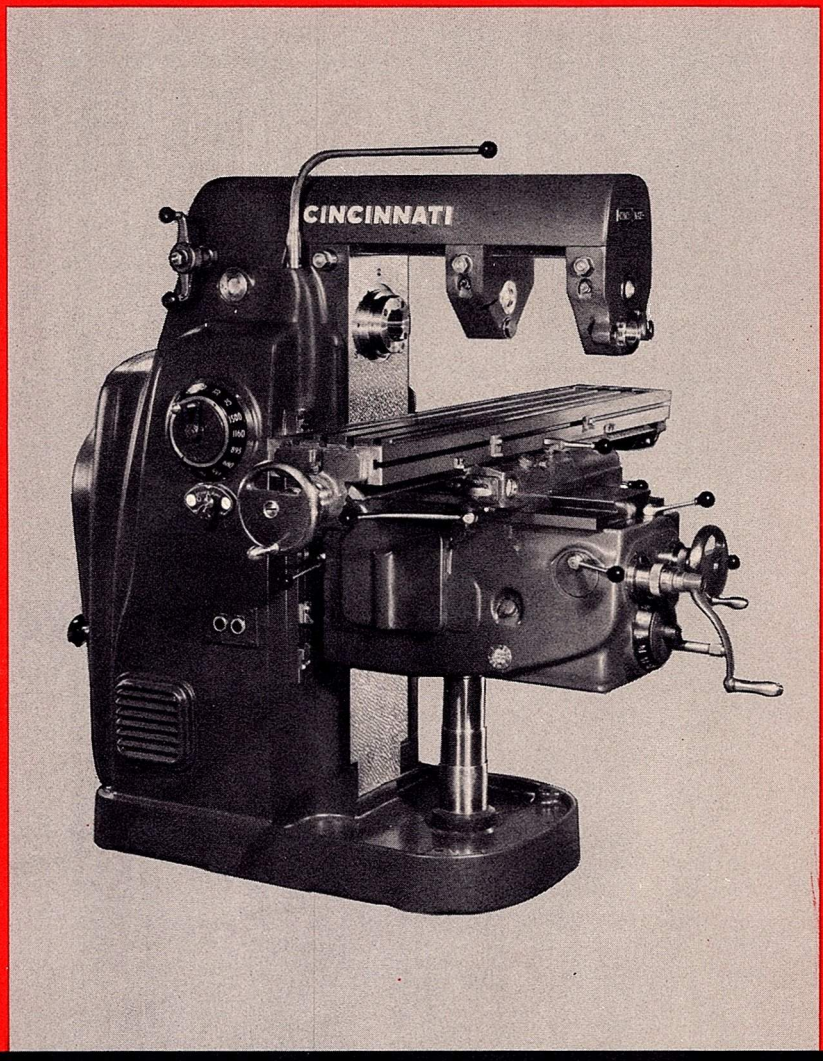
CINCINNATI

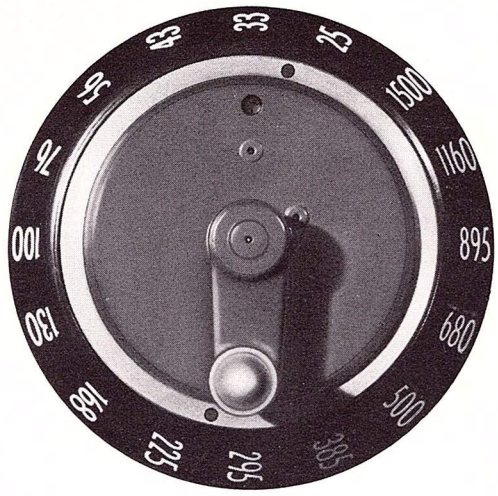
nos. 2ML and 2MI MILLING MACHINES

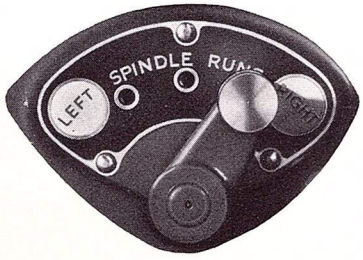


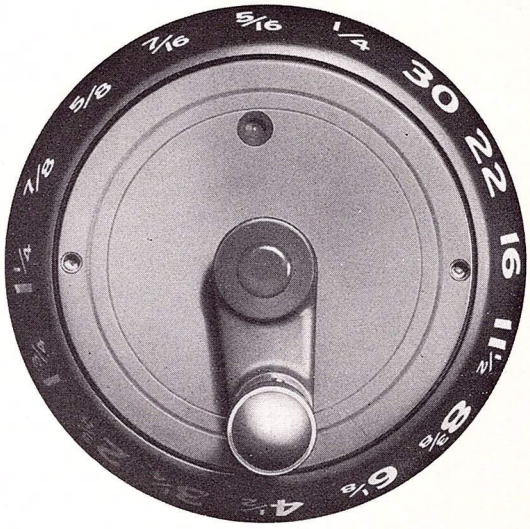
THE CINCINNATI MILLING MACHINE CO. CINCINNATI 9, OHIO, U.S.A.

Publication No. M-1662-1

CINCINNATI Nos. 2ML and 2MI





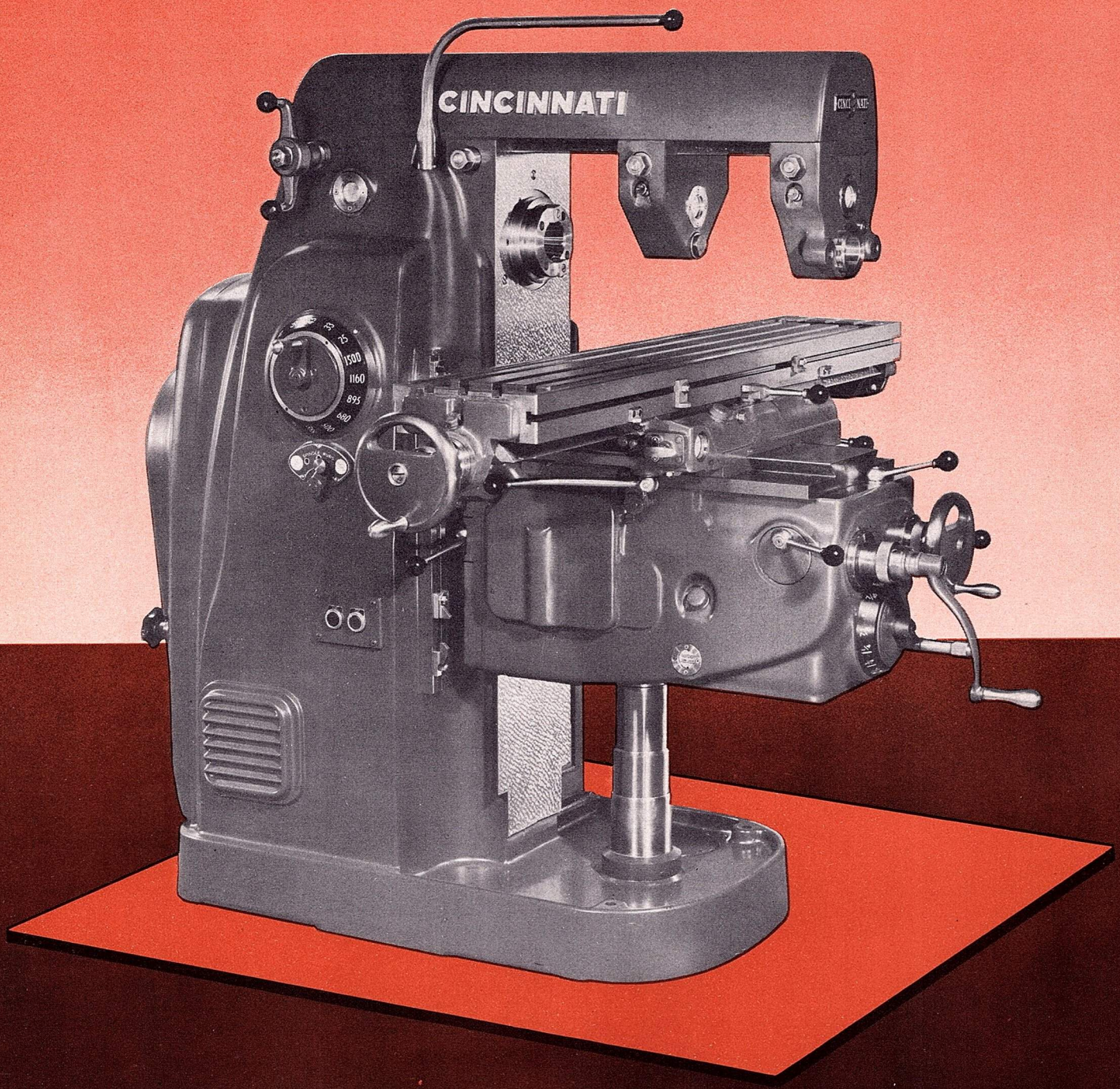


Cincinnati Nos. 2ML and 2MI Milling Machines have many exclusive and interesting features. Some reduce production costs, while others increase safety and dependability, quickly gaining operator acceptance. A wide variety of milling operations may be assigned to these machines, from those requiring extremely low feed rates to those employing high spindle speeds. To increase versatility still further, a wide selection of attachments are available. The No. 2MI's are built in plain, universal, and vertical styles. No. 2ML's are built in plain and universal styles only. Illustrated descriptions and specifications are contained on the following pages.

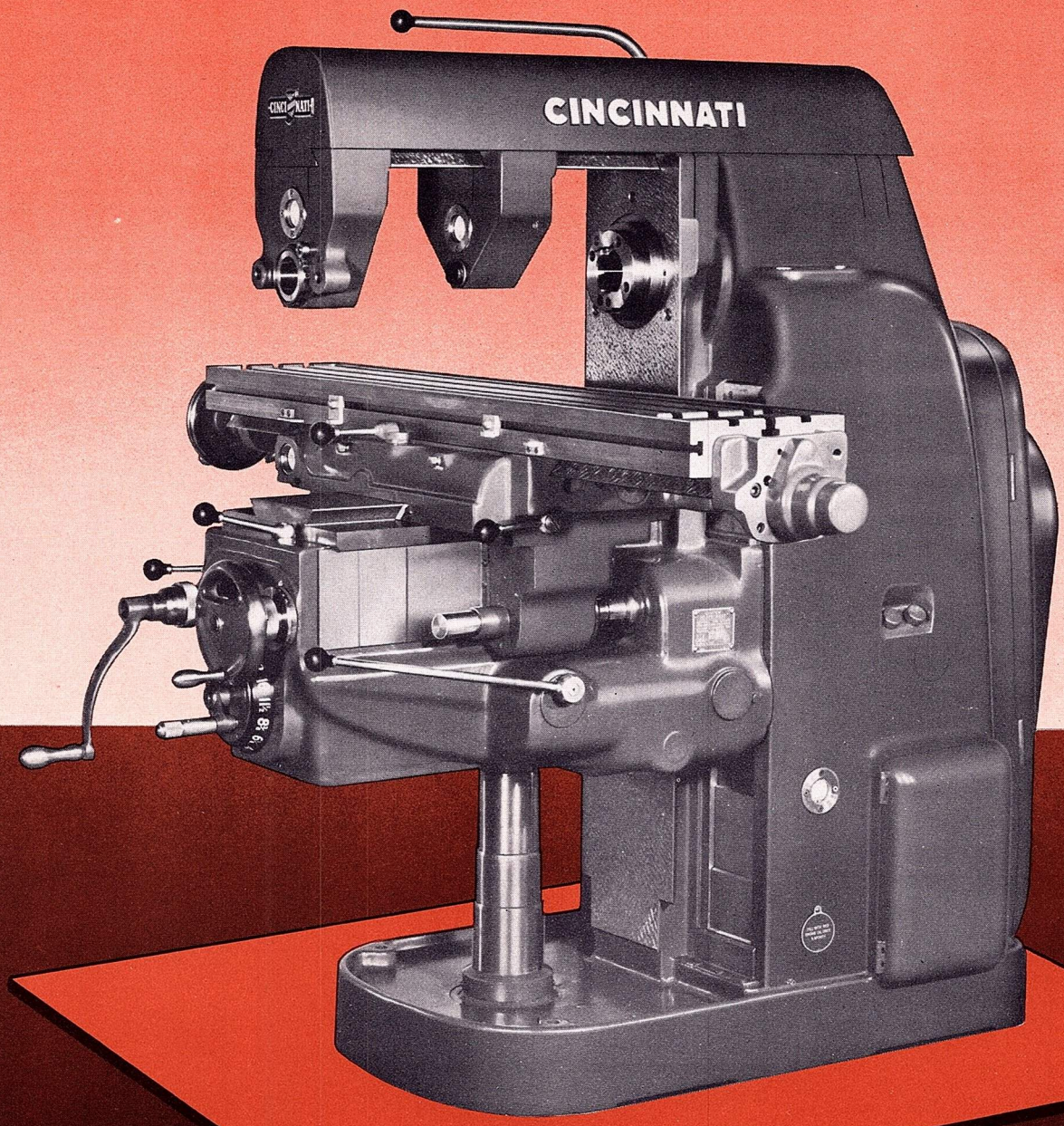
HIGHLIGHTS OF DESIGN

CINCINNATI

Cincinnati



Nos. 2ML and 2MI PLAIN MILLING MACHINES



CINCINNATI

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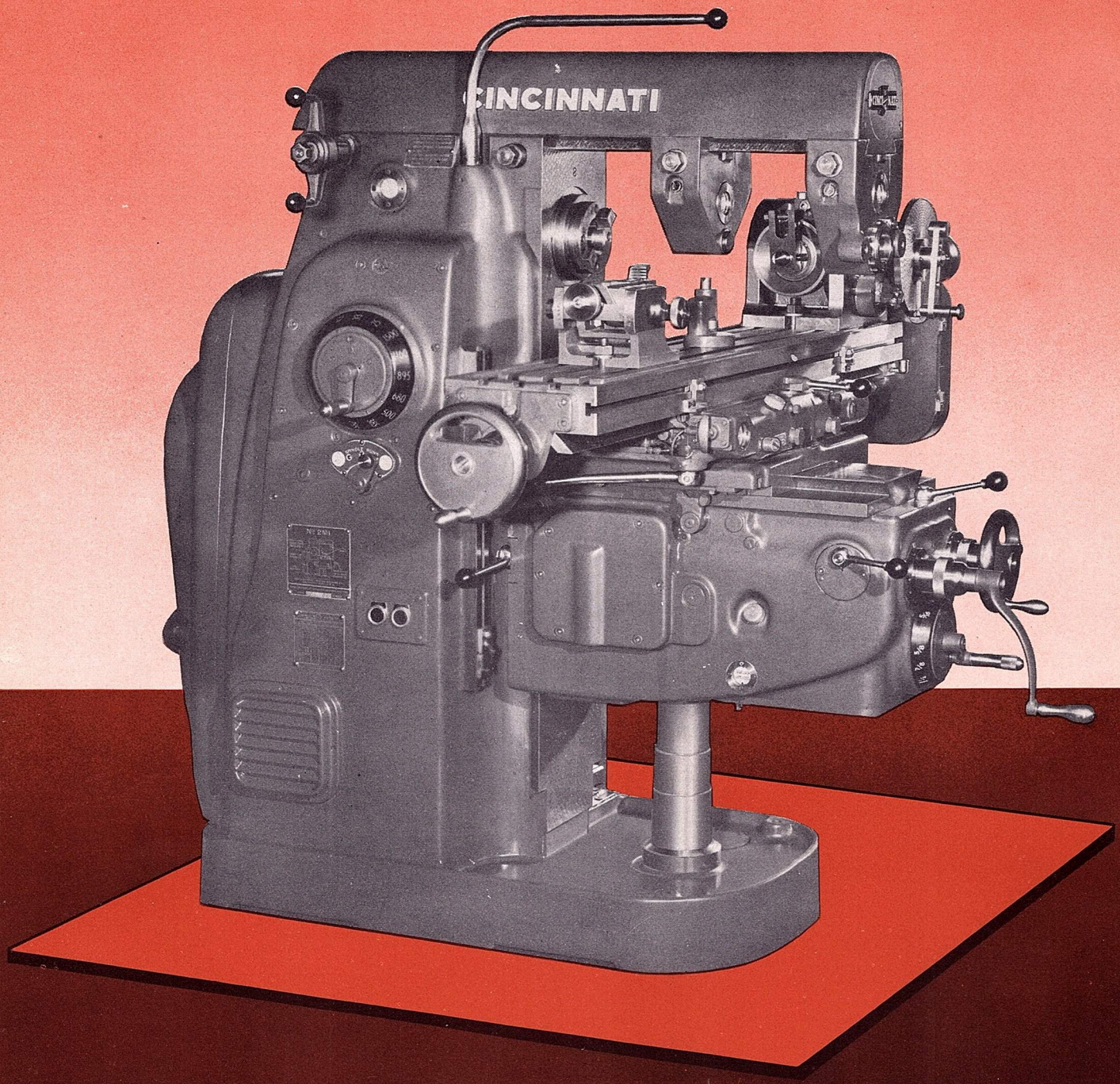
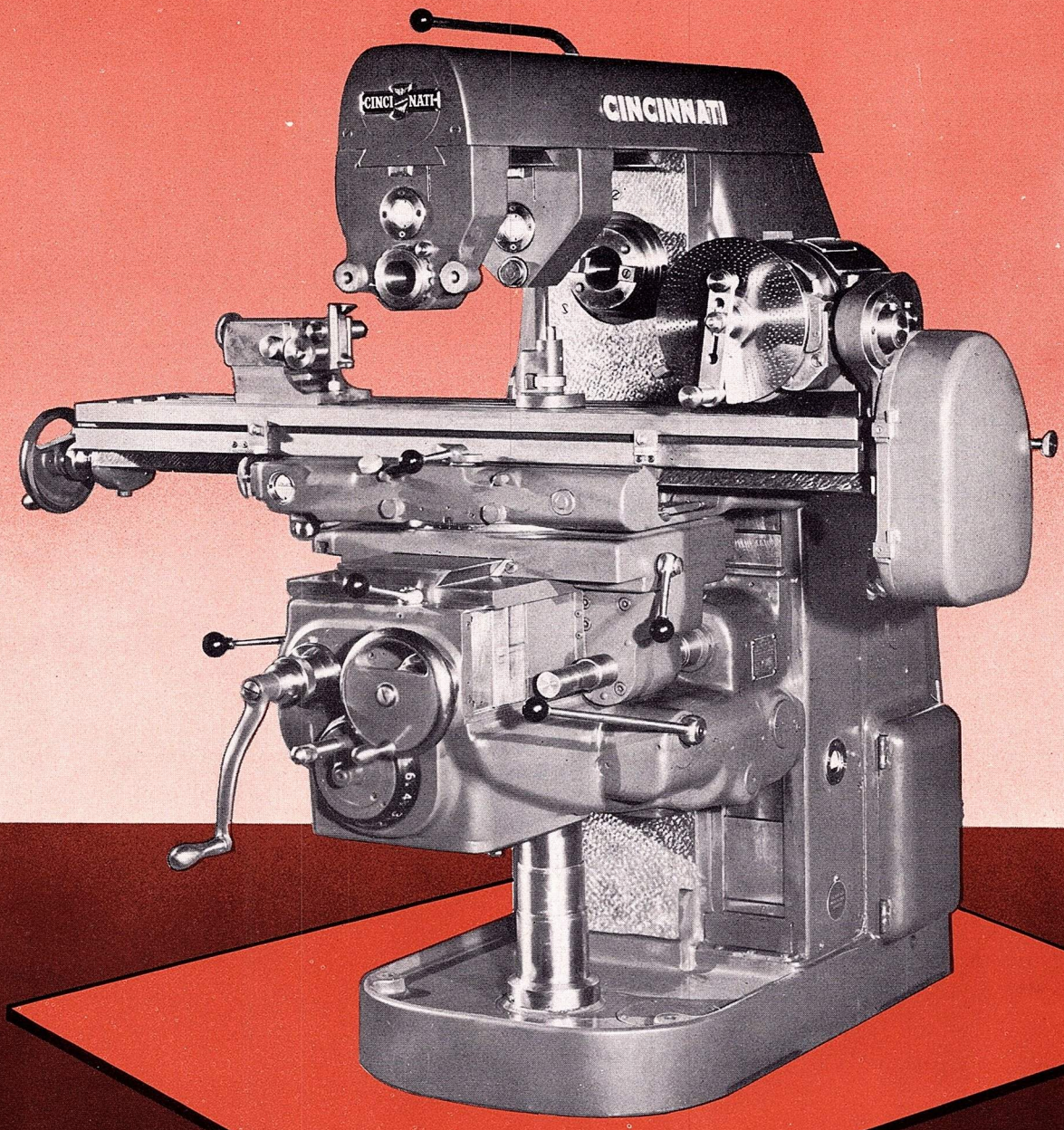


Nos. 2ML and 2MI UNIVERSAL MILLING MACHINES



CINCINNATI

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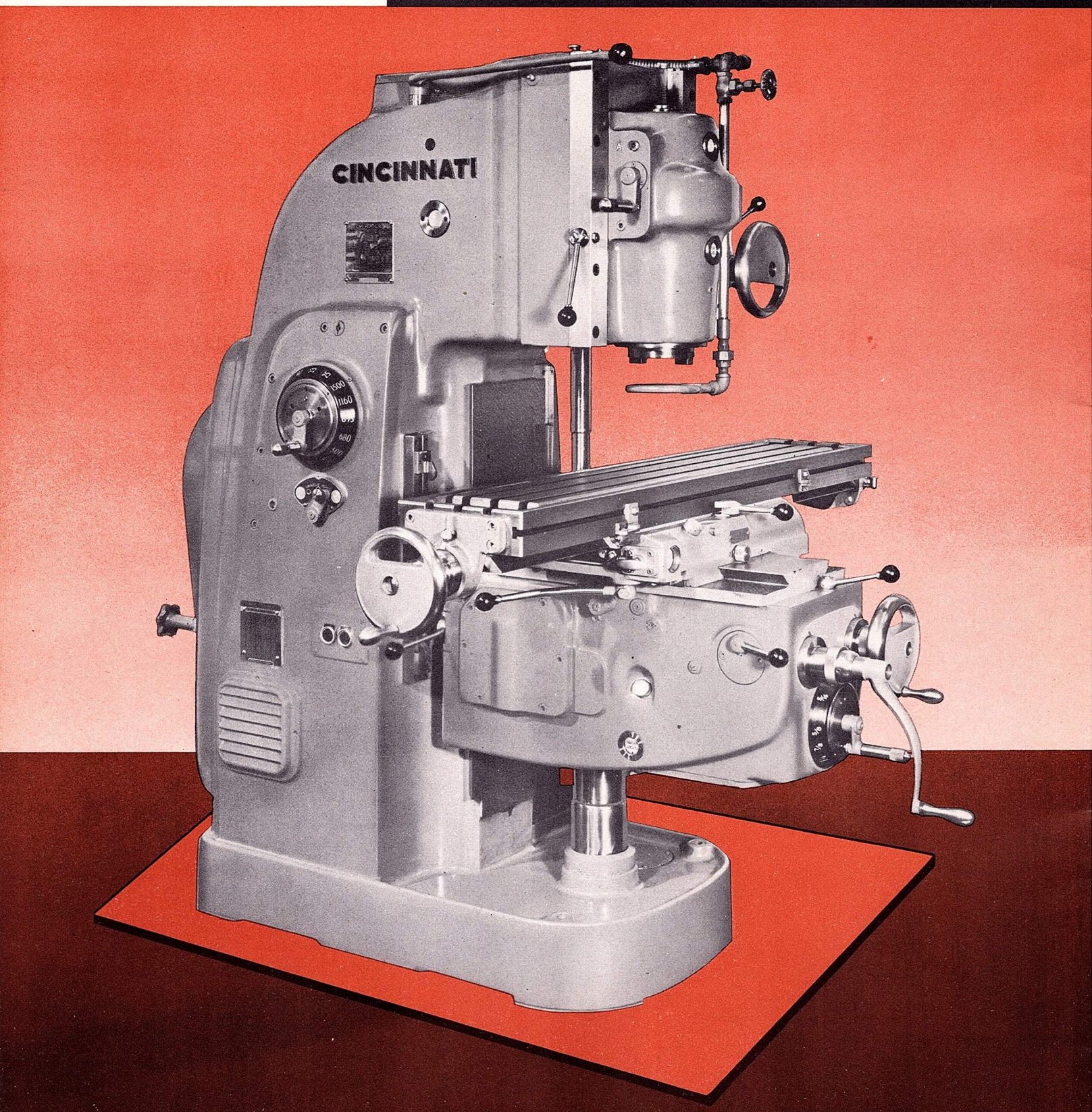
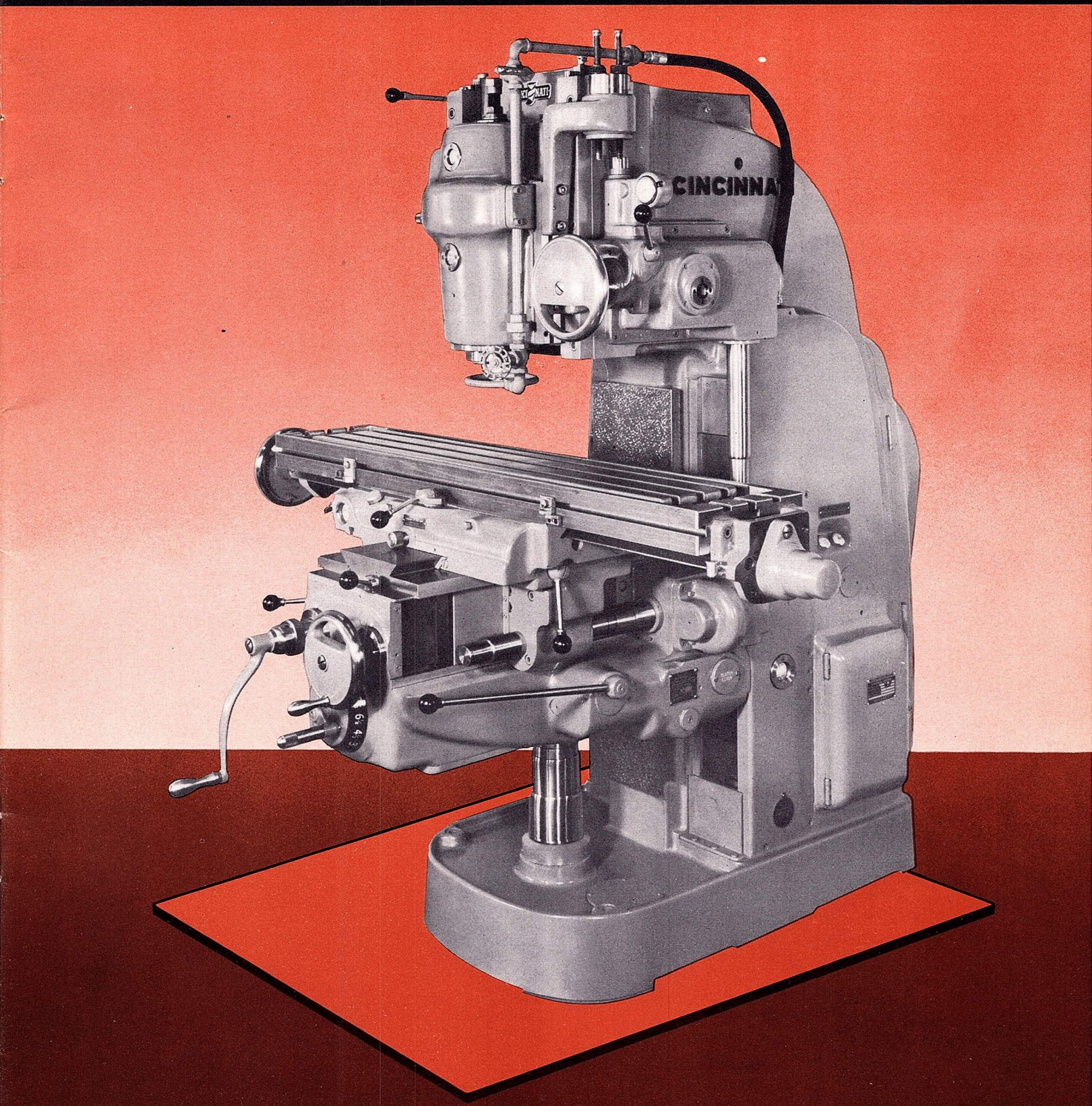


No. 2MI VERTICAL MILLING MACHINE



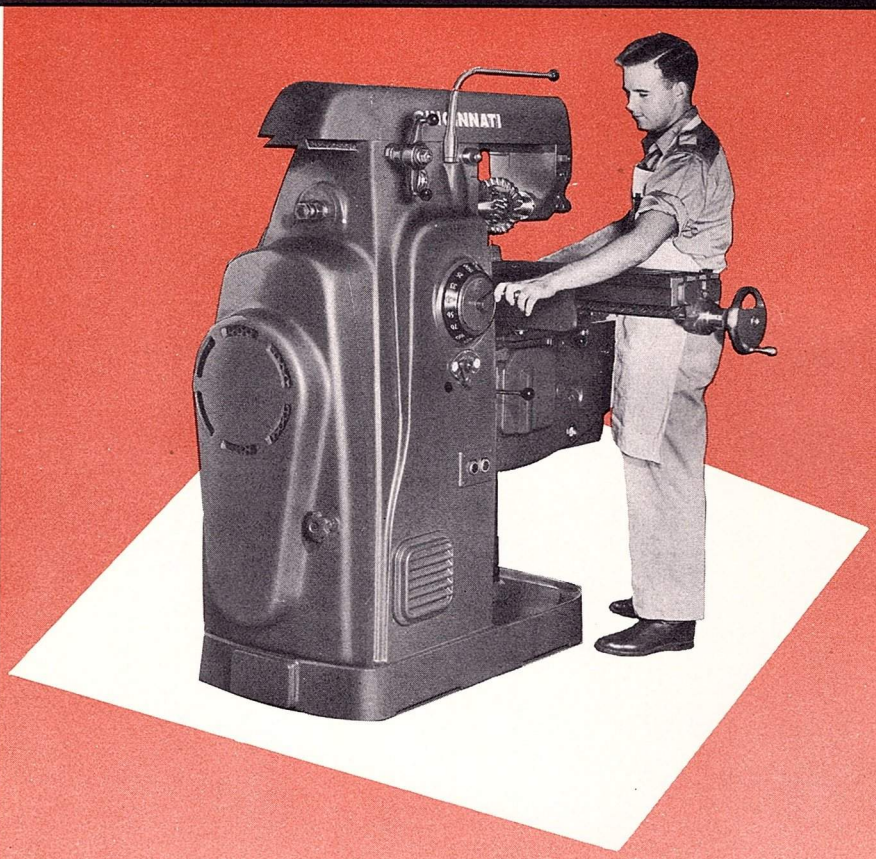
SIXTEEN SPINDLE SPEEDS 60 to 1 RATIO

The 2ML and 2MI spindle speed ratio of 60 to 1 offers top efficiency in milling operations on parts made of various grades of steel, cast iron, aluminum, bronze . . . using cutters ranging from face mills to small end mills. You have a choice of three ranges of speeds, all in approximate geometrical progression.

Standard Range (Supplied unless otherwise specified) 25 to 1500 r.p.m.

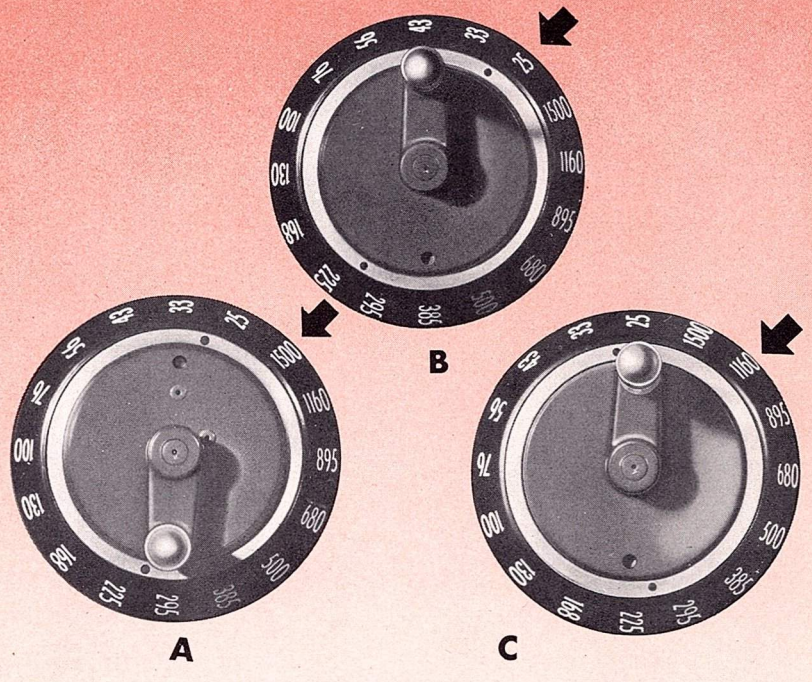
Optional Low Range 20 to 1200 r.p.m.

Optional High Range 33 to 2000 r.p.m.

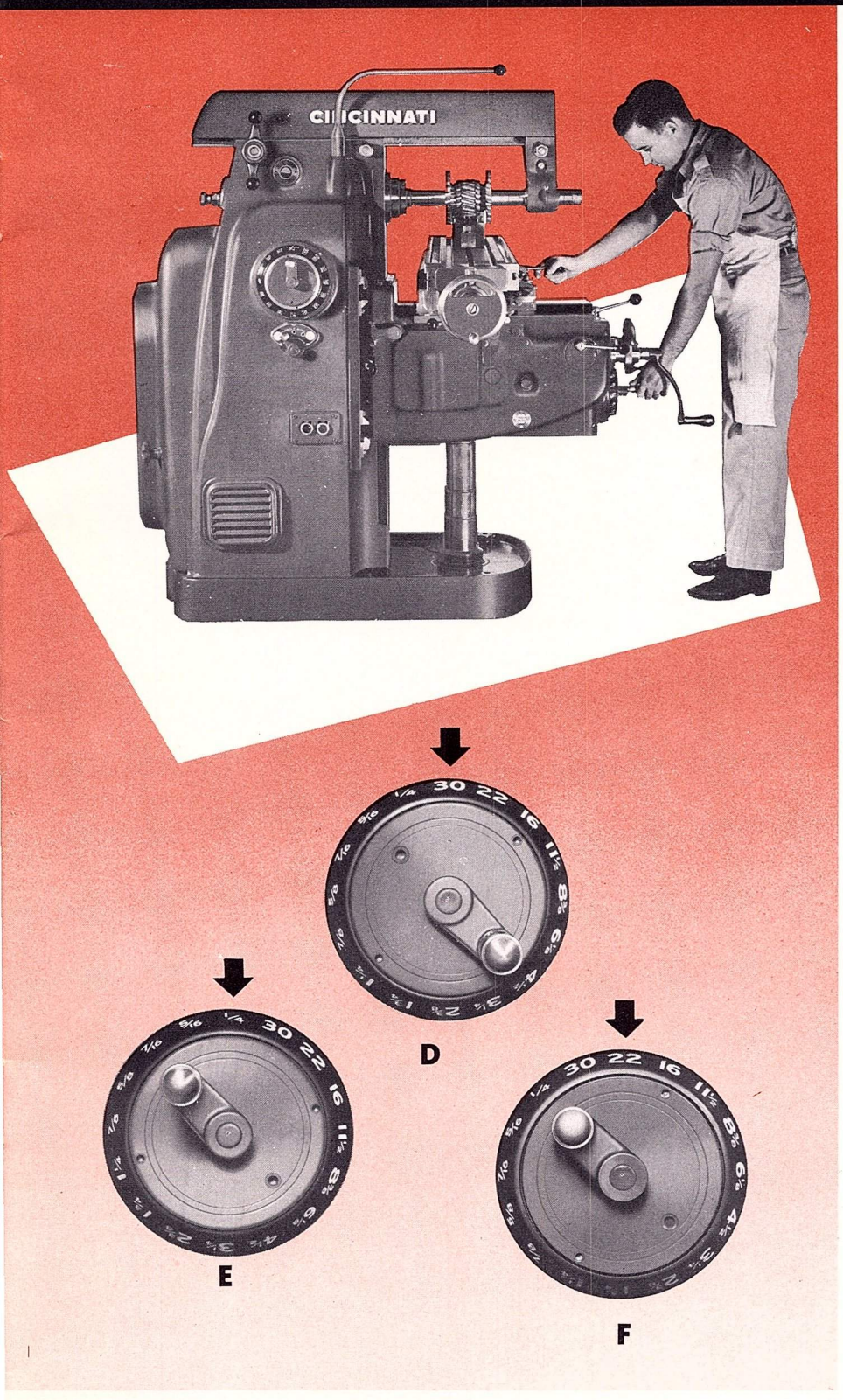


SINGLE CRANK SELECTION OF COMPLETE RANGE OF SPEEDS

● A single crank type control selects the complete range of spindle speeds. The only manual effort required is that of rotating a selector valve; hydraulic power does the actual work of shifting gears. One-half revolution of the crank, either way, selects the next higher or lower spindle speed. From A to B in the illustrations at the right the lever was rotated one-half revolution clockwise; from A to C, it was rotated one-half revolution counter-clockwise. While the spindle is running, the speed change crank is automatically locked.



Nos. 2ML and 2MI MILLING MACHINES



SIXTEEN FEEDS 120 to 1 RATIO

The advantage offered by a high feed ratio is very important in general purpose milling machines, for the correct feed per tooth is then available for milling a wide range of materials, from hard steel to aluminum; using various types of cutters including the complete range of end mills, form cutters, saws, plain and helical cutters, fly cutters, and others. Cincinnati Nos. 2ML and 2MI Millers have an exceptionally high feed ratio: 120 to 1!

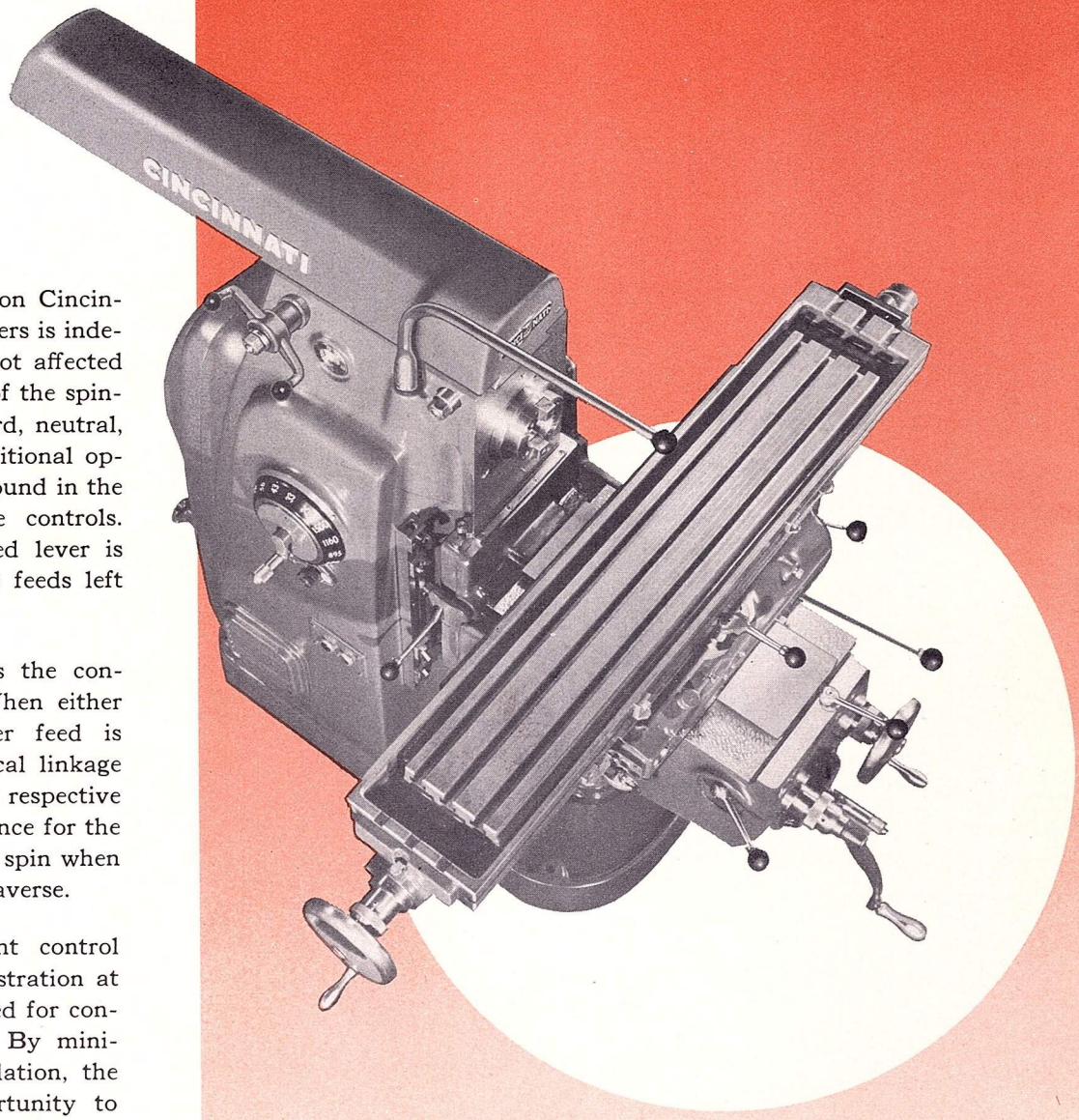
Standard Range (Supplied unless otherwise specified) .....¼″ to 30″ per min.

Optional High Range ½″ to 60″ per min.

SINGLE CRANK SELECTION OF COMPLETE RANGE OF FEEDS

● A single crank type control, at the operator's working position, selects any feed within the complete range. One-half revolution, in either direction, rotates the dial in the same direction to the next feed rate setting, and meshes the proper gears for that feed. Assuming a feed rate setting of 30″ per min., indicated by D at the left, one-half clockwise revolution of the crank changes the feed rate to ¼″ per min. (E); one-half counter - clockwise revolution changes the feed rate to 22″ per min. (F).

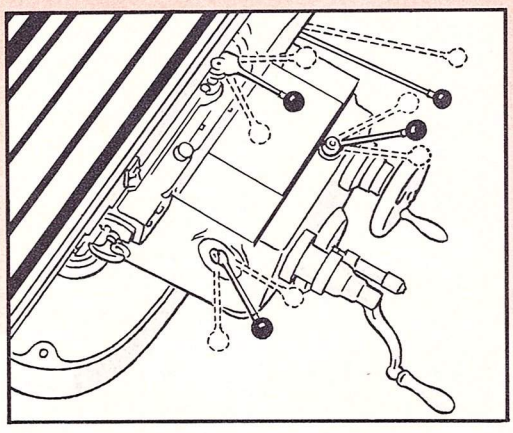
INDEPENDENT AND CENTRALIZED FEED CONTROL LEVERS



● Each feed engaging lever on Cincinnati Nos. 2ML and 2MI Millers is independent of the others, and not affected by the direction of rotation of the spindle. Each has its own forward, neutral, and reverse position. An additional operating convenience will be found in the "directional" feature of the controls. That is, when the table feed lever is moved to the left, the table feeds left and so on.

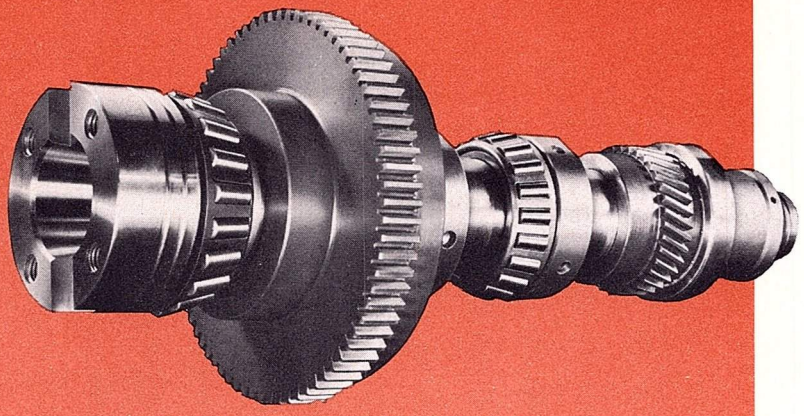
Safety of operation features the construction of the controls. When either the cross or vertical power feed is engaged, a positive mechanical linkage automatically disengages the respective hand control. There's no chance for the hand wheel or hand crank to spin when using power feed or rapid traverse.

Both hand and power front control levers, spotlighted in the illustration at the right, are logically grouped for convenient and easy operation. By minimizing the effort of manipulation, the operator has a better opportunity to turn out his best work.



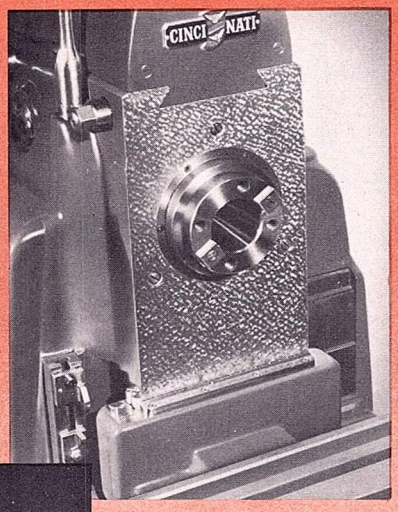
Drawing of Longitudinal, Cross and Vertical Feed Levers, Showing Neutral and Engaged Positions.

Nos. 2ML and 2MI MILLING MACHINES



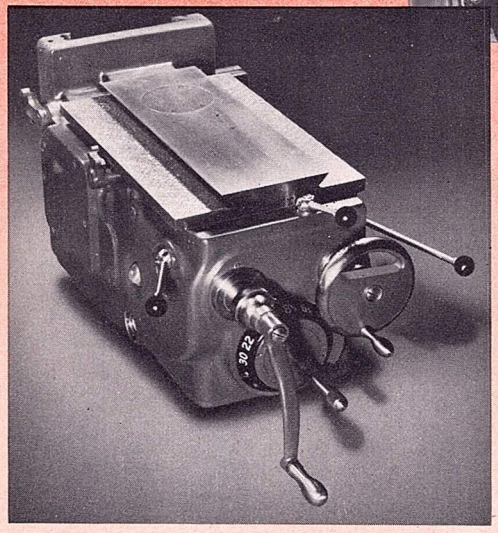
SPINDLE

● The photograph at the left shows the spindle of a horizontal machine. Note the anti-friction mounting . . . precision tapered roller bearings at the front and center, and a precision roller bearing at the rear. Extra metal in the bull gear provides a fly-wheel effect so desirable when using sintered carbide cutters having widely spaced teeth.



APRON EXTENSION ON KNEE

● Cost of manufacture has been disregarded in designing the knee with an apron extension (left). This construction increases the length of bearing between the knee and column, and consequently decreases deflection under cutting pressures. The wiper built into the apron extension keeps the face of the column clean.



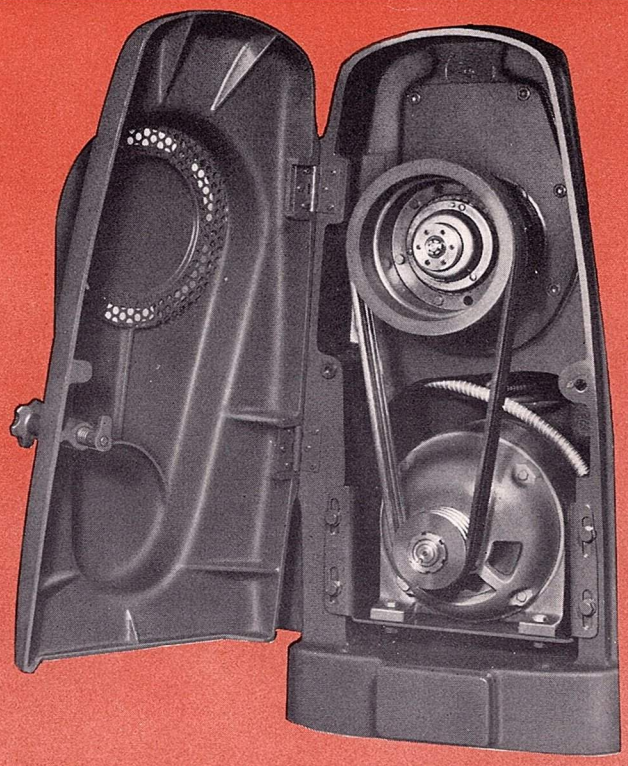
COMPLETELY ENCLOSED KNEE

● Feed change gearing is assembled as a unit and bolted to the bottom of the knee casting. Along with the solid top knee, this compact construction is easy to keep clean; prevents grit and fine chips from entering the feed transmission.

ENCLOSED MOTOR WITH CRADLE TYPE MOUNTING

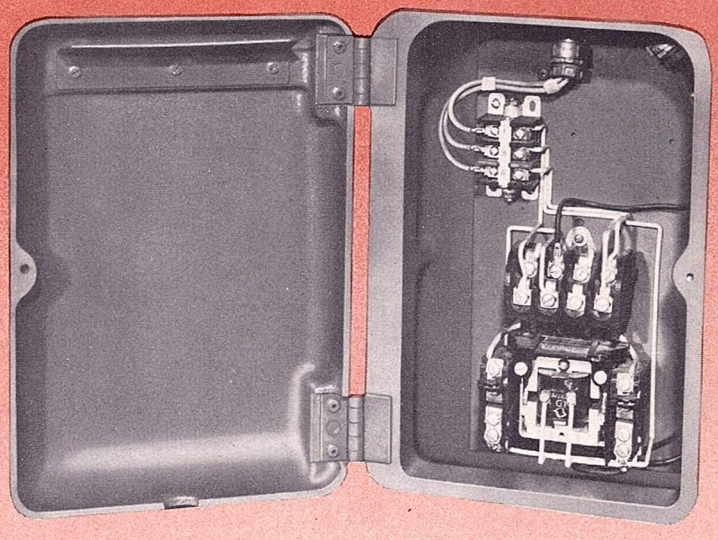
● Like other Cincinnati knee-and-column type milling machines, the ML and MI drive motor is enclosed in the column. The motor shaft and first drive shaft in the machine are parallel, thereby greatly simplying the drive.

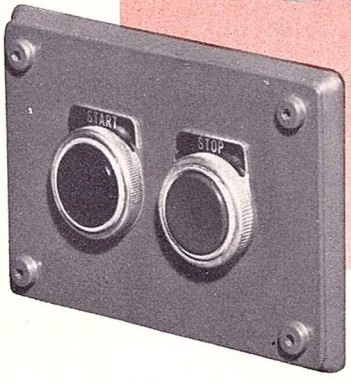
Quick accessibility and convenient belt adjustment is offered by the cradle type mounting. The motor is bolted to the cradle outside the machine, then the complete unit can readily be swung into place and bolted to the column with four screws.



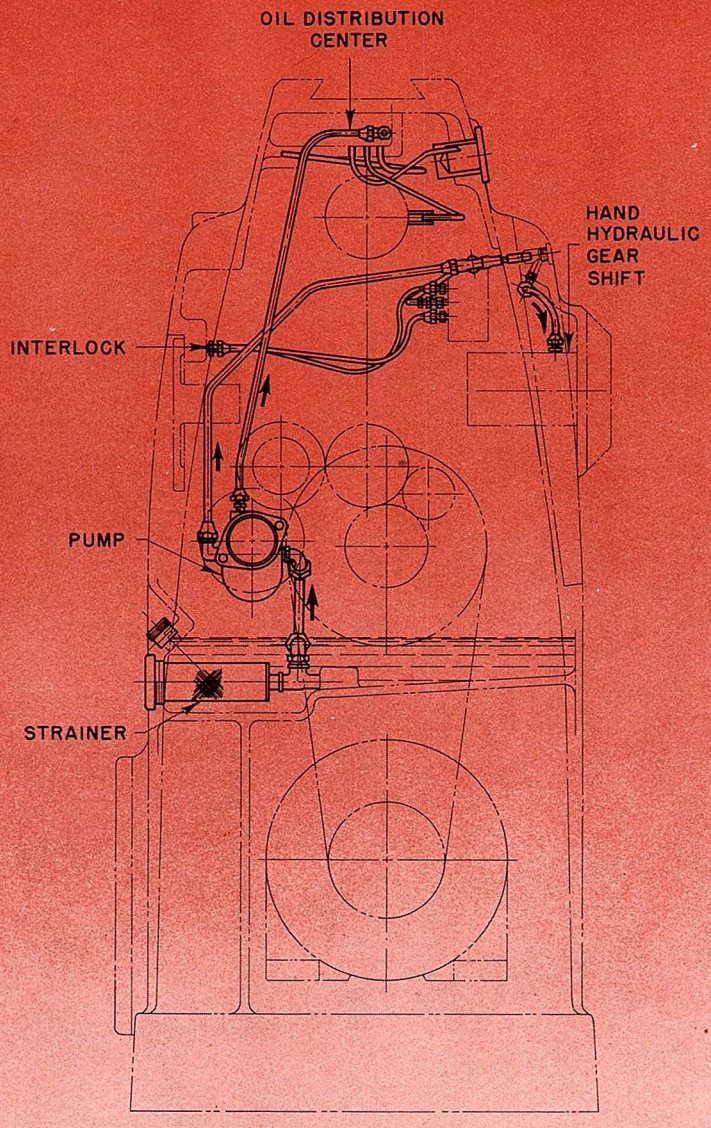
BUILT-IN ELECTRICAL CONTROLS AND PUSH BUTTONS

● Electrical controls are built into the column, at the right hand side of the machine. A hinged cast iron cover (right), with screw fastening, protects the controls from damage and dust. An important safety feature for the operator will be found in the control transformer, included in all electrical circuits over 220 volts. It provides 110 volts at the push button station. These buttons are built into the left-hand side of the column, where they may be easily reached.





Nos. 2ML and 2MI MILLING MACHINES

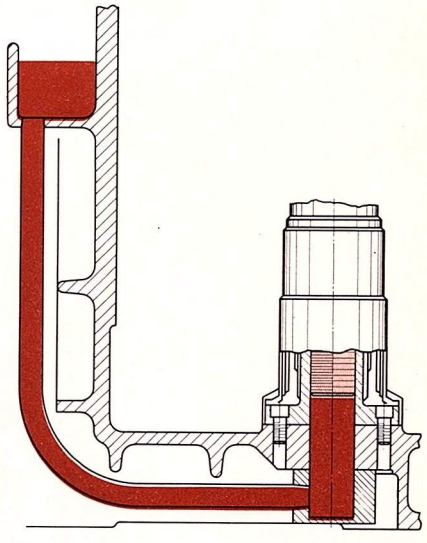


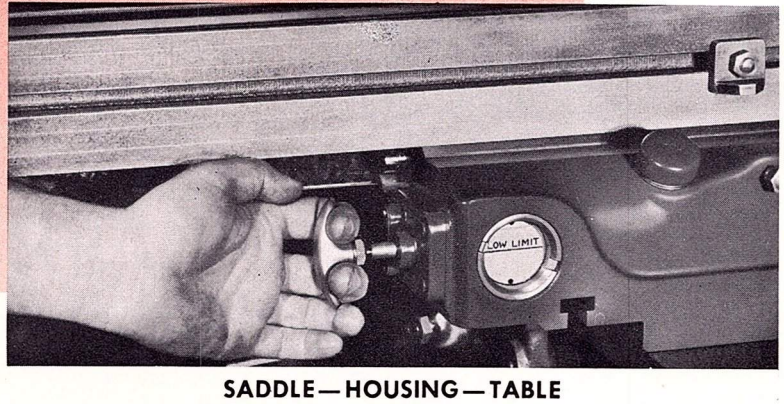
COLUMN

AUTOMATIC AND OIL-SHOT LUBRICATION

● Cincinnati Nos. 2 ML and 2 MI Milling Machines require little attention, because lubrication is principally automatic. Oil reservoirs are easy to fill and each has an individual glass covered flow or level gage, where the oil can be readily seen. The vertical feed screw has its own lubricating system. An oil reservoir, located in the column, feeds oil to the bottom of the "pedestal" in which the screw operates. In effect, the screw runs in a bath of oil, admitting it to and exhausting it from the tubular reservoir as the knee traverses up and down.

VERTICAL SCREW

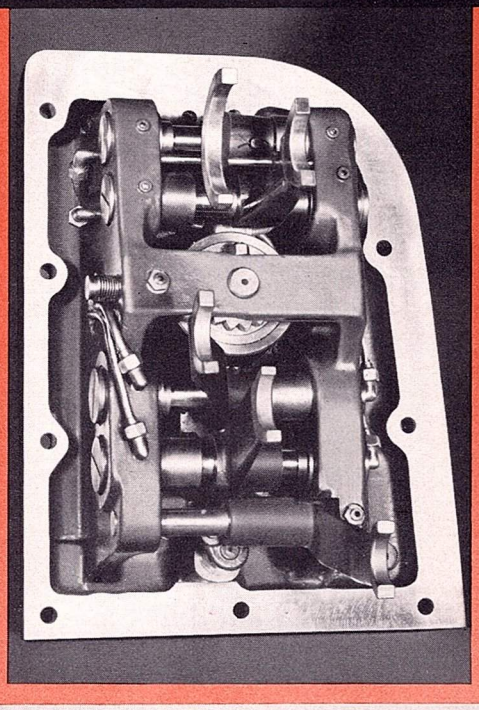


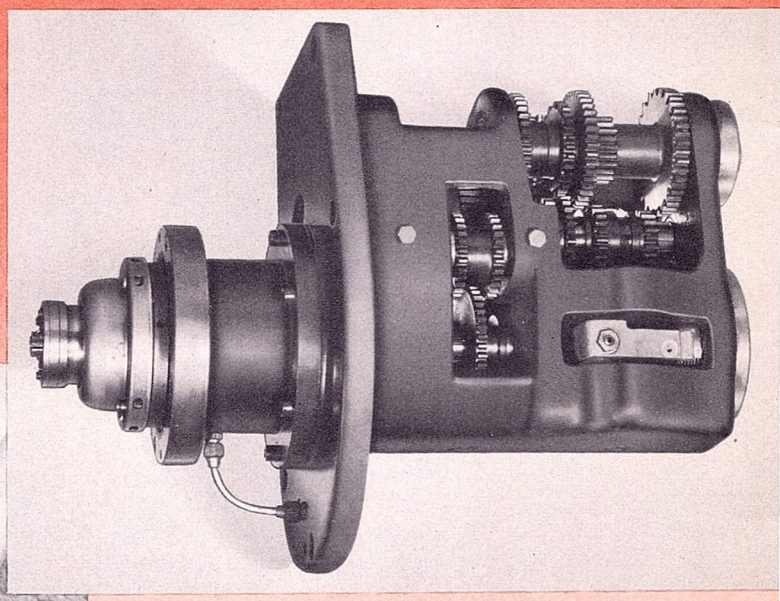


SADDLE—HOUSING—TABLE

UNIT CONSTRUCTION

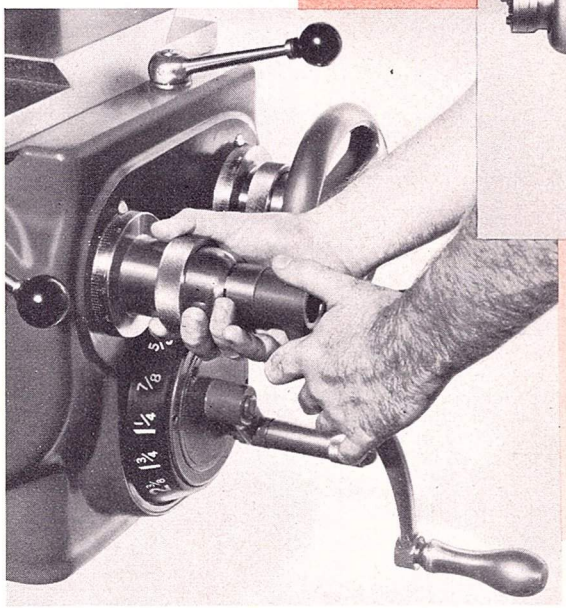
● Unit construction offers a potential value which may save hours of precious time when necessary to service the machine. Two units are shown here . . . the spindle drive unit, which contains all the drive gears up to the spindle (center illustration), and the speed gear shifter unit (right). Feed drive gearing constitutes a compact unit bolted to the under-side of the knee.





QUICK ADJUSTING MICROMETER DIALS

● Large micrometer dials for manual feed adjustments are reset by merely pulling them out against a light spring pressure. No thumbscrews to loosen; no "play" or looseness in the clutch teeth.



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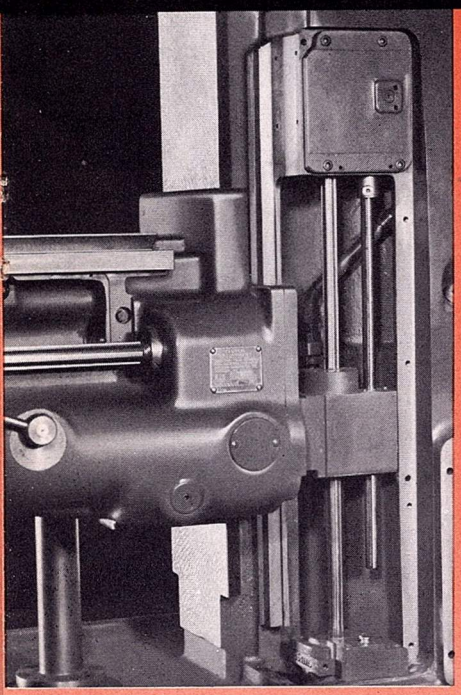
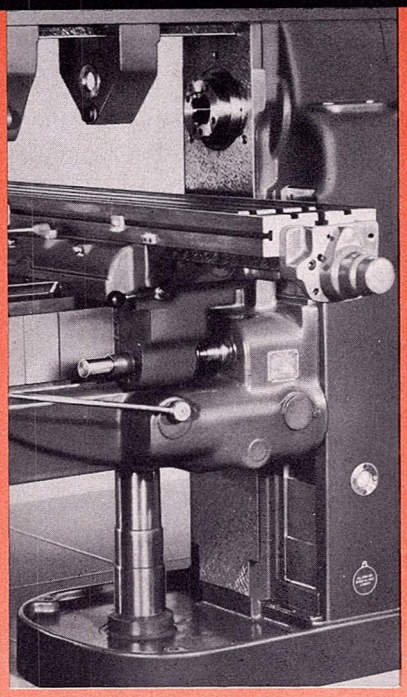
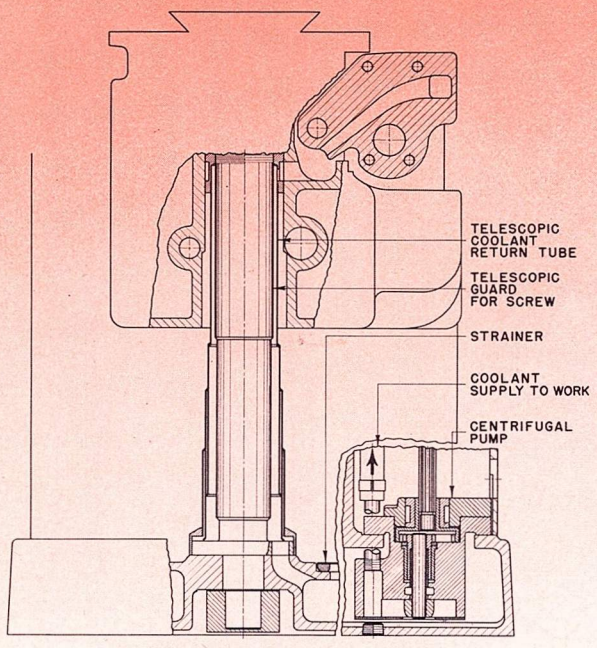




ENCLOSED CROSS SCREW AND SPLINE SHAFTS

● The knee, saddle, and pump drive shafts are completely enclosed, increasing the safety of operation and improving the appearance of the machine. The cross screw is also enclosed, protected by sliding covers against the ravages of dust and grit. Two illustrations at the left, an MI Miller partially assembled and another view of the completed machine, show how this has been accomplished.



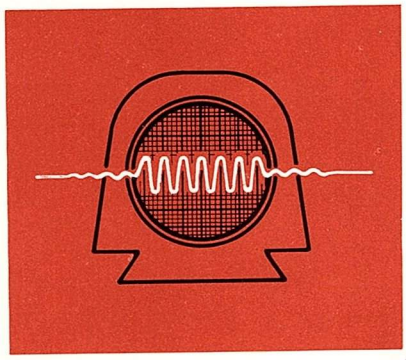
BUILT-IN COOLANT PUMP

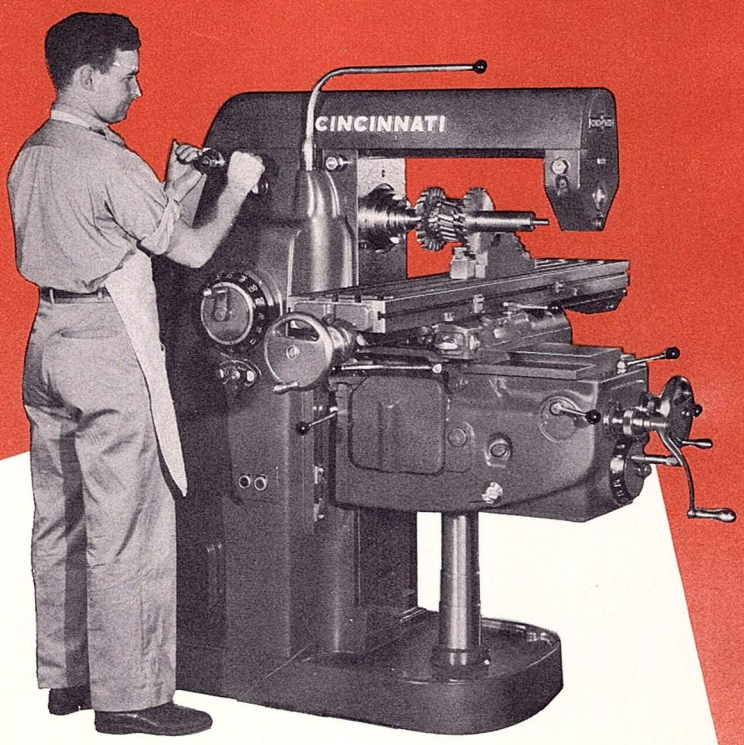
● The coolant pump, a centrifugal type of two gallons per minute capacity, is mounted in the machine base, at the bottom of the recess cast in the column. It is driven from the machine by the larger of the two vertical shafts. Notice the unique coolant return system, illustrated in the drawing. The coolant flows through cored holes in the table to a trough in the saddle and to the bracket on the knee. Then it is directed to the telescopic tubes, and returns to the base through the cylindrical space between the two sets of tubes.

DYNAPOISE OVERARM

● Cincinnati's well known "rectangular" design has been followed for the overarms of ML and MI Plain and Universals. Its dovetail construction offers an important advantage in accuracy of alignment: the overarm is clamped against the solid locating side of the column, while arbor supports and attachments clamp against the corresponding side of the overarm. Adjustment to position, as required when setting up the machine, is accomplished with a minimum of time and effort through the pilot wheel control.

● Although its lines are familiar, the overarm has a unique internal construction; it incorporates the exclusive chatter-damping DYNAPOISE unit. This device gives the machine extra value in smooth, efficient metal cutting.





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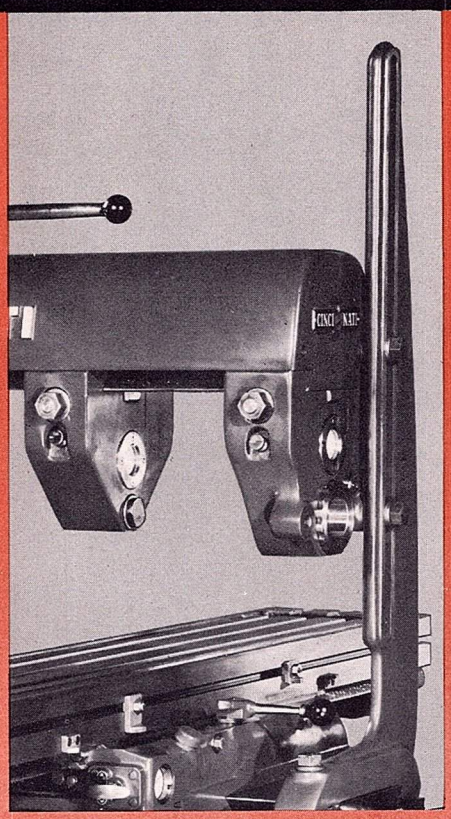
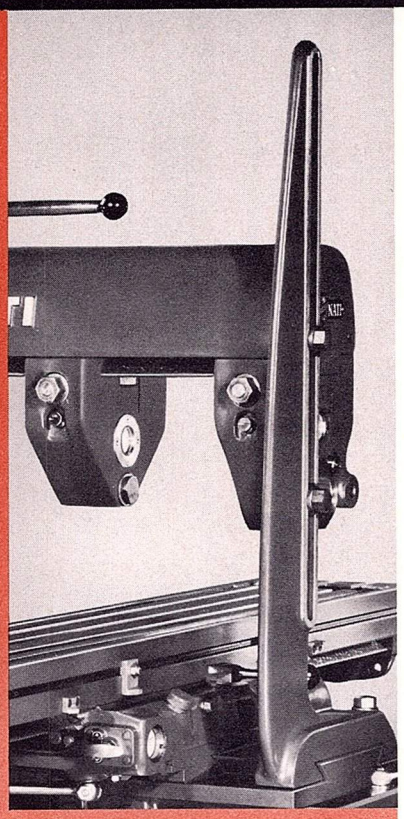
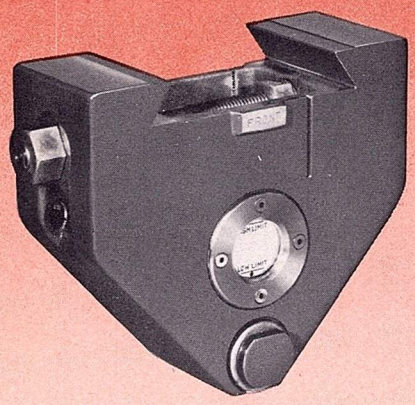




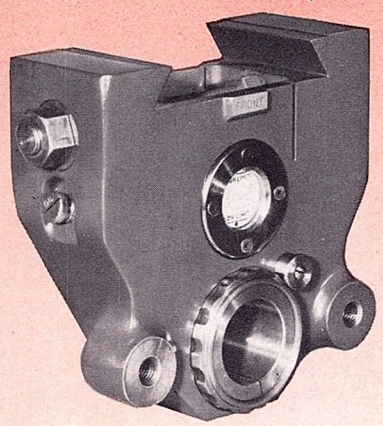
SINGLE PIECE REVERSIBLE BRACE

● The arbor support brace (left) has a bridle section at its lower end, effectively tying together the knee and arbor support when taking extra heavy cuts. Single piece reversible construction greatly facilitates the use of this auxiliary support, as it can be attached to the machine to suit the preference of the operator, the direction of feed, and type of fixture.



TYPE "A"

TYPE "B"

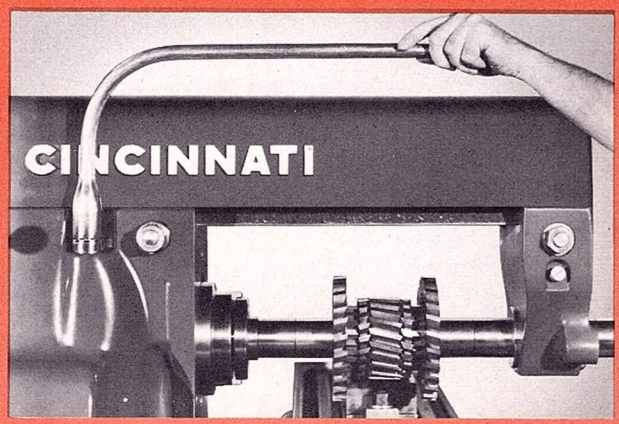


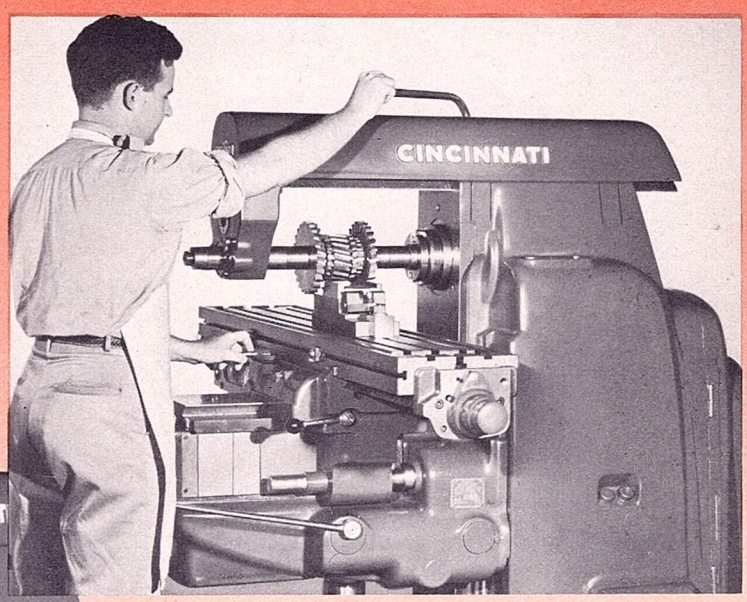
ARBOR SUPPORTS

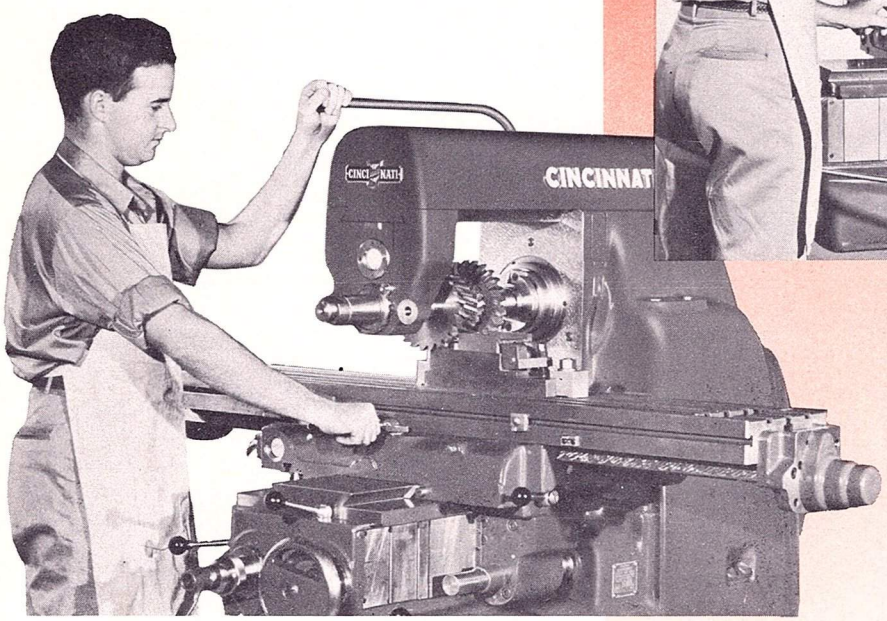
● Arbor supports are made of aluminum to reduce their weight and facilitate handling. They're self oiling . . . the dust-tight reservoir at the center has sufficient capacity for several days. And a glass window at the front of the unit indicates the oil level. Two types are supplied with the machine: type A for arbors having a pilot end, and type B (with lugs for brace) for arbors having bearing collars.

ADJUSTABLE STARTING LEVER

● Another useful feature of the Nos. 2ML and 2MI Milling Machines is the adjustable starting lever. Clutch teeth are milled in the end of the lever, engaging similar clutch teeth in a collar pinned to the vertical shaft extending from the column. This design offers greater convenience in starting the machine from any desired working position at the front of the table, or from the rear working position. The operator merely raises the lever out of engagement with the clutch teeth, and swings it to the angle desired.







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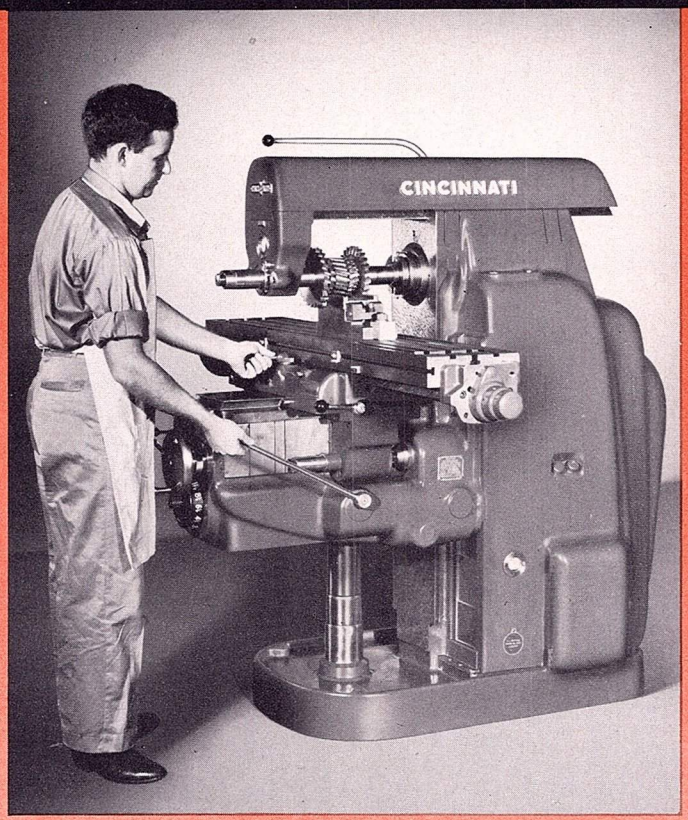
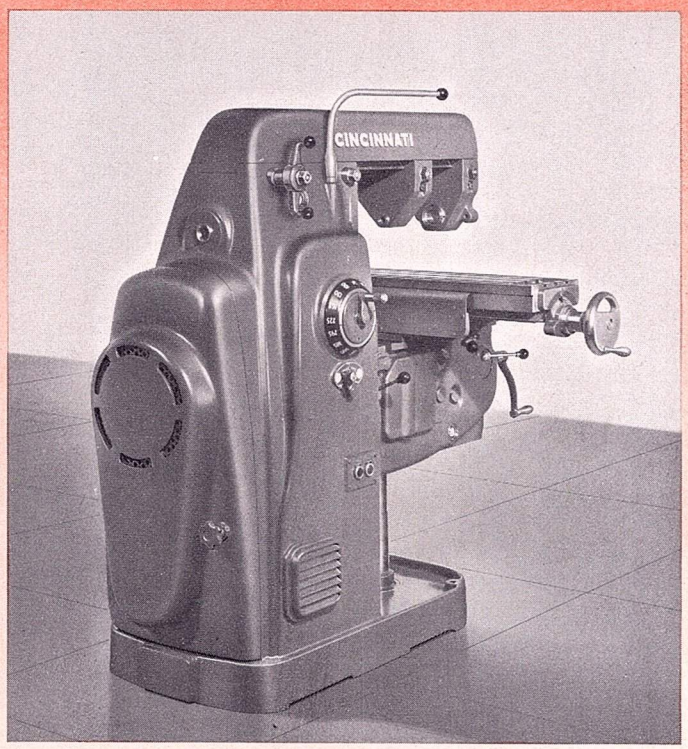


LIVE RAPID TRAVERSE 150 INCHES PER MINUTE

● "Live" rapid traverse offers quick movements of the table, saddle, and knee by power, while the spindle is stopped as well as when it is rotating. A light, upward pull on the long lever at the right of the knee engages this feature. A convenience for the set-up man, it enables him to make his major traverse movements with a minimum of effort. It's safer for the operator, too. He can stop the spindle and safely brush the chips from the work and fixture during the return stroke of the table.



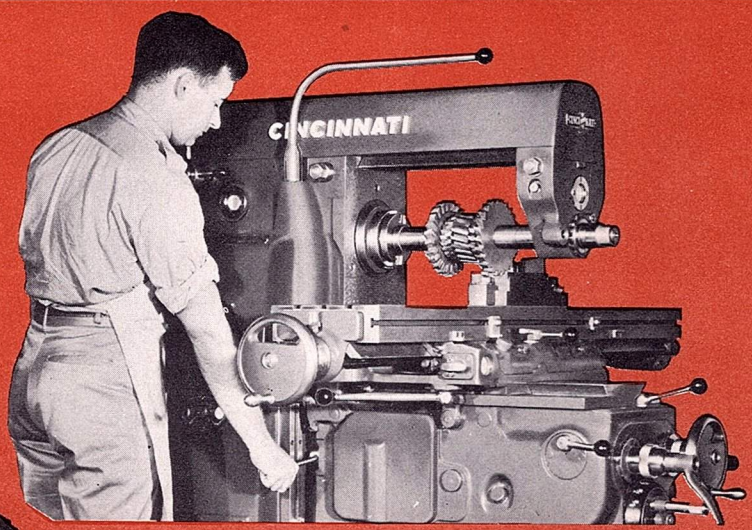
STURDY COLUMN WITH SMOOTH LINES

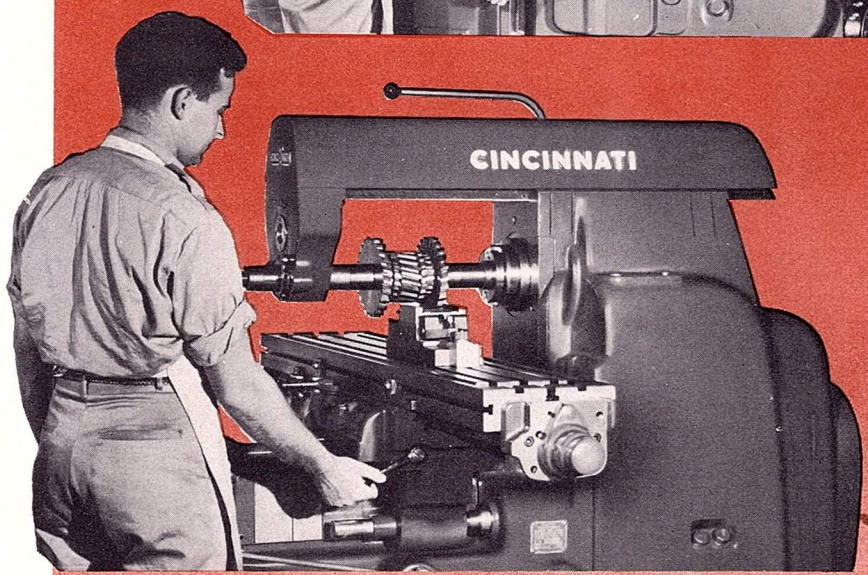
● Note the sturdy, pyramid shape of the column (left). This construction is visible evidence of a rugged framework; an important requirement for vibrationless milling. Note, too, the smooth lines of the column and pleasing blend of the units. This aids good housekeeping, for the machine is easy to keep clean.

CLAMPING ELEMENTS SADDLE • TABLE • KNEE • OVERARM

● Clamping elements are screw actuated to assure a tight grip and to prevent loosening while the machine is cutting. Saddle and knee clamps are lever operated (right), while the table, overarm and arbor supports are clamped in position with wrenches. Should the operator forget to loosen the saddle, table, or knee clamps before engaging the feed, a safety clutch slips, protecting the machine.

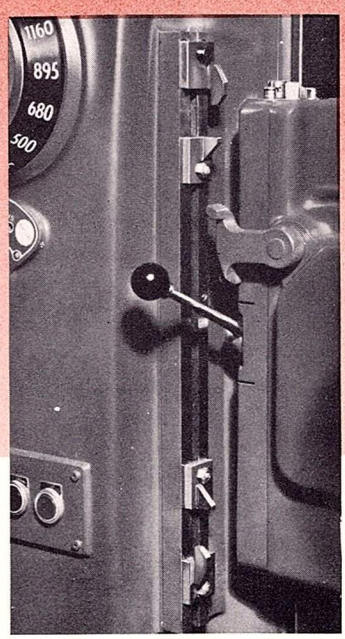
Notice the design of the rear overarm clamp (sketch below). A clamping screw extends through the hub of the pilot wheel, bringing the nut forward and out of the way of the operator's hands when adjusting the overarm. The front overarm clamp follows the design of other Cincinnati milling machines.

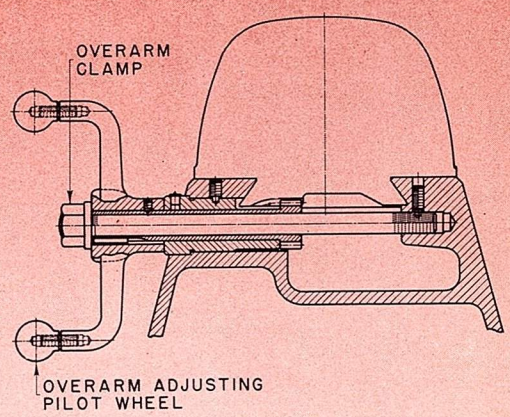




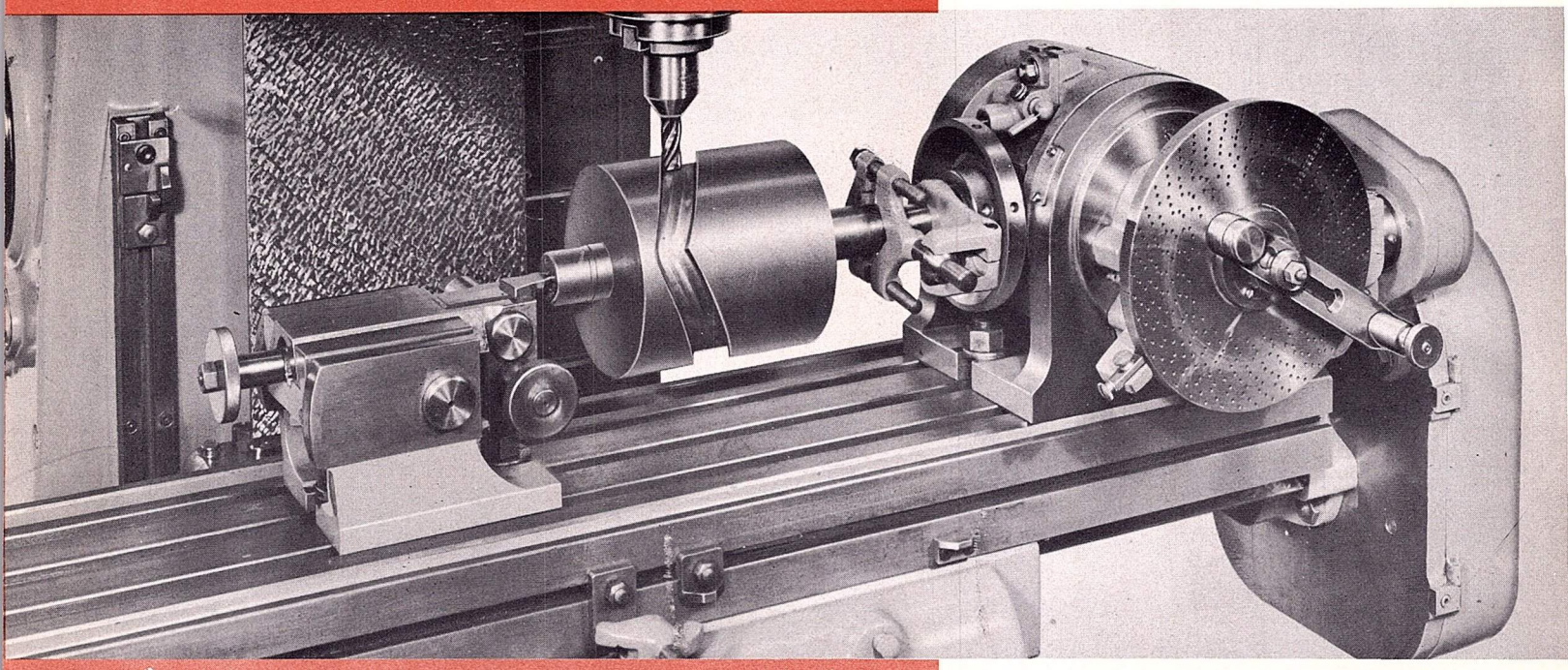
POSITIVE LIMIT DOGS

● Although conventional trip dogs are provided for automatic kick-out of power feeds, the feed drive mechanism is further protected by positive limit dogs on the table, saddle and column. This is additional evidence of protection against damaging the machine through oversight. Column trip dogs and positive limit dogs are shown at the right.





Nos. 2ML and 2MI MILLING MACHINES



DIVIDING HEAD

● The Cincinnati Dividing Head and Driving Mechanism, supplied as standard equipment with Universal Milling Machines, increases the variety of work which may be assigned to the machine to include spur and helical gears, worms, various types of cams, spline shafts, cutters and reamers, face mill cutter bodies, etc.

Two indexing devices are built into the Dividing Head. (1) The crank at the side indexes the spindle through a 40 to 1 reduction, offering a choice of over 200 numbers including all numbers up to 60. (2) The index pin and plate at the front is a direct arrangement, for work requiring only a few equally spaced divisions. For work requiring a wider range of divisions, the Wide Range Divider can be built into the Dividing Head.

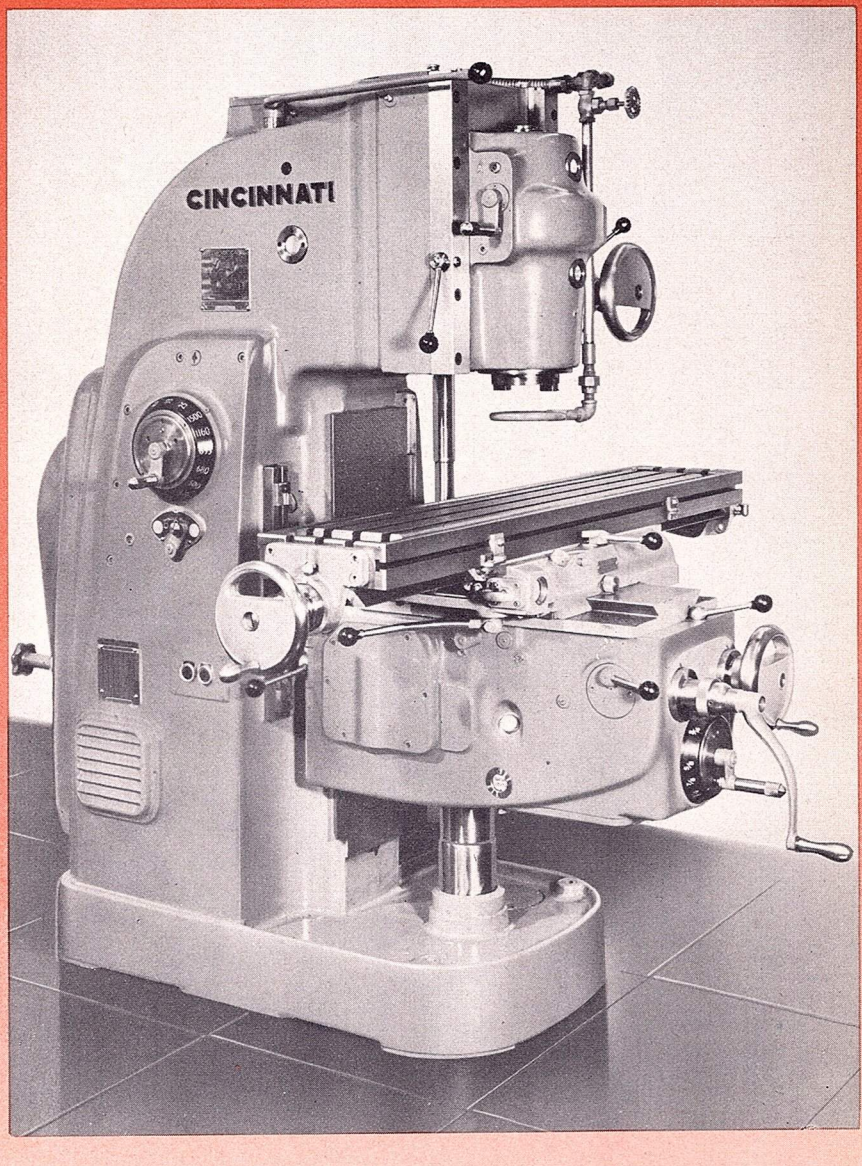
For taper work held between centers, the tailstock center support may be raised and lowered, and swiveled 10°. For work held in a chuck or on a face plate; the front end of the Dividing Head spindle is threaded to receive these units. For work which must be swiveled at an angle to the milling machine table, the Dividing Head swivel range of 145° in a vertical plane covers all practical requirements.

VERTICAL MACHINES
(No. 2MI only)

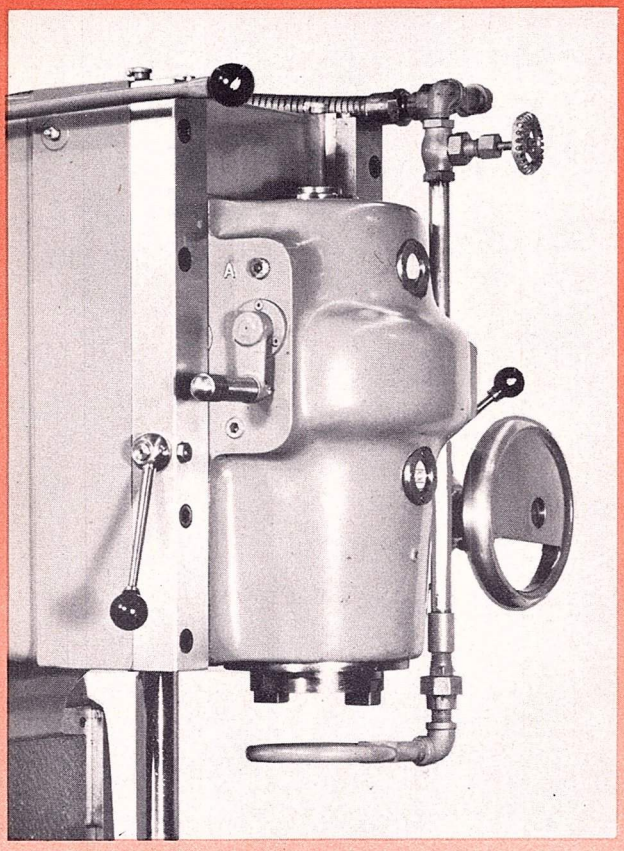
● The MI Vertical offers several important advantages to shops requiring machines of this type. For example, instead of the conventional rack and pinion, adjustment and power traverse of the vertical head is through a screw and nut, completely enclosed and automatically flood lubricated for sustained accuracy. Power feed and power rapid traverse to the head, and a four position turret stop, are included with the machine. This equipment speeds up boring operations; facilitates the milling of production work having finished surfaces at various heights.

Here are the more important vertical head specifications to consider in purchasing additional machines or replacement equipment within the No. 2 vertical range.

VERTICAL MACHINES	No. 2 MI Vertical
1. Power feed and power rapid traverse to head.	*included*
2. Four position turret stop.	*included*
3. Power feeds to head.	*Sixteen 1/8" to 15" per min.*
4. Power rapid traverse to head.	*75" per minute*
5. Screw feed to head.	*yes*
6. Quick acting taper gib clamp.	*yes*
7. Full length bearing in ways, any position.	*yes*
8. Individual lubrication system.	*yes*
9. Scavenger pump to prevent leakage.	*yes*
10. Automatic kick-out of vertical head handwheel.	*yes*



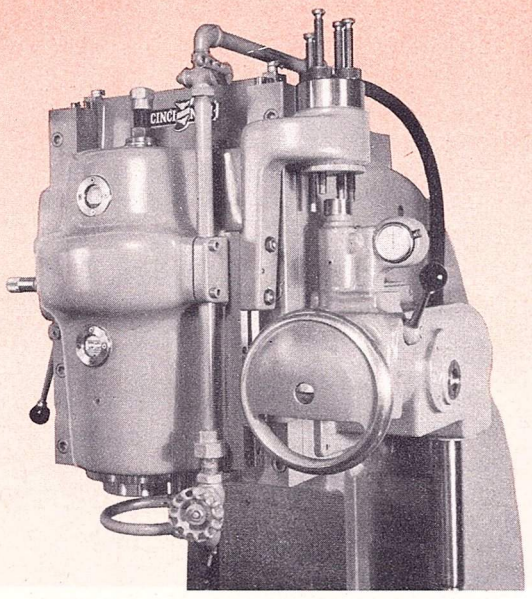
No. 2MI VERTICAL MILLING MACHINE



VERTICAL MACHINES . . . BACK GEAR AND TAPER GIB CLAMP
(No. 2MI only)

● Back gear drive to the vertical head maintains consistently low and more desirable speeds in the transmission, stretching the life span of the anti-friction bearings as far as possible. With the exception of the change-over from one group of eight consecutive spindle speeds to another, accomplished with the back gear lever, speeds are selected with the half turn of a single crank, as for horizontal machines.

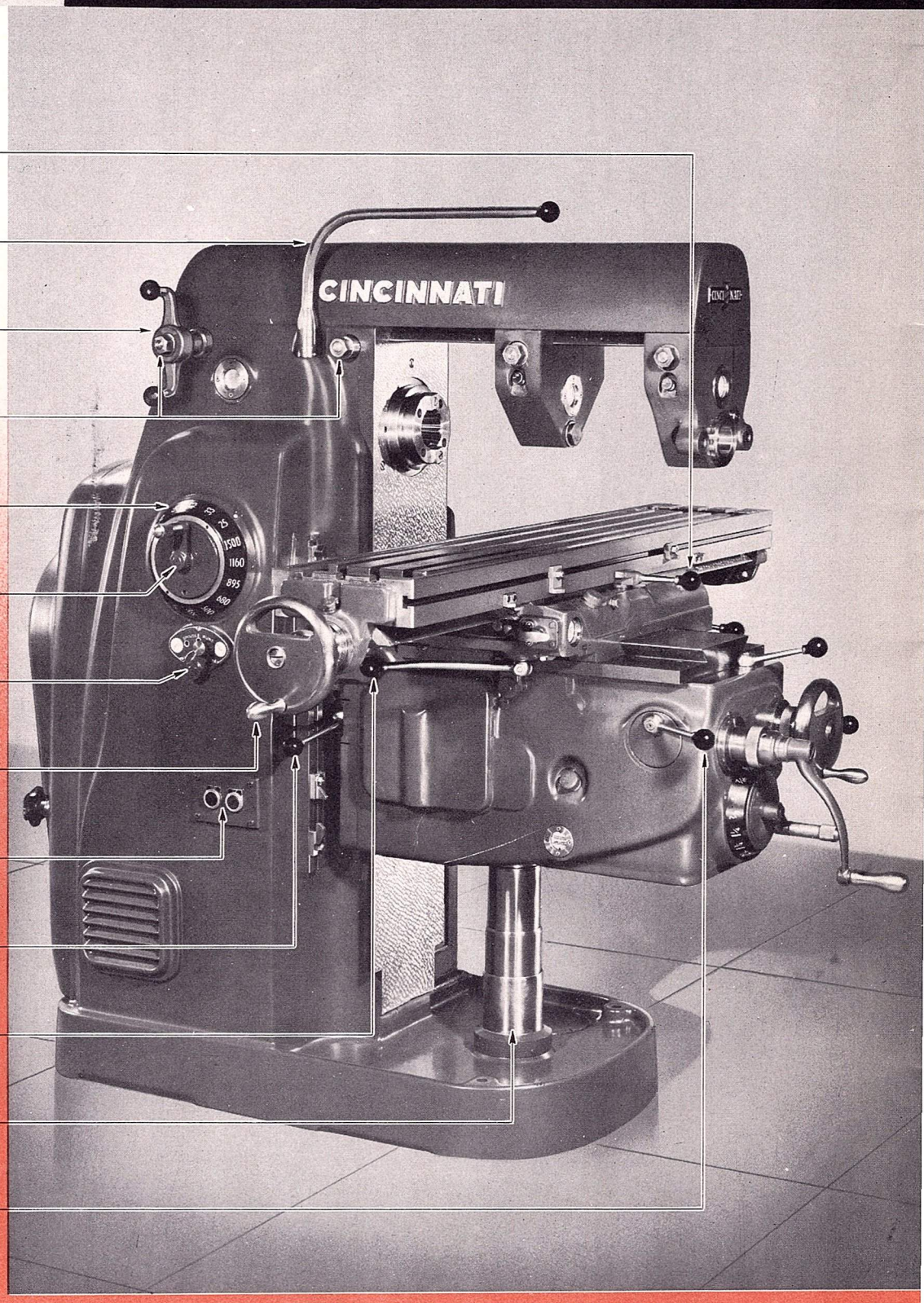
Note the convenient vertical head clamping lever, also shown at the left. Through a taper gib wedge, it clamps the head accurately, firmly, and its full length.



VERTICAL MACHINES . . . POWER FEEDS AND POWER RAPID TRAVERSE
(No. 2MI only)

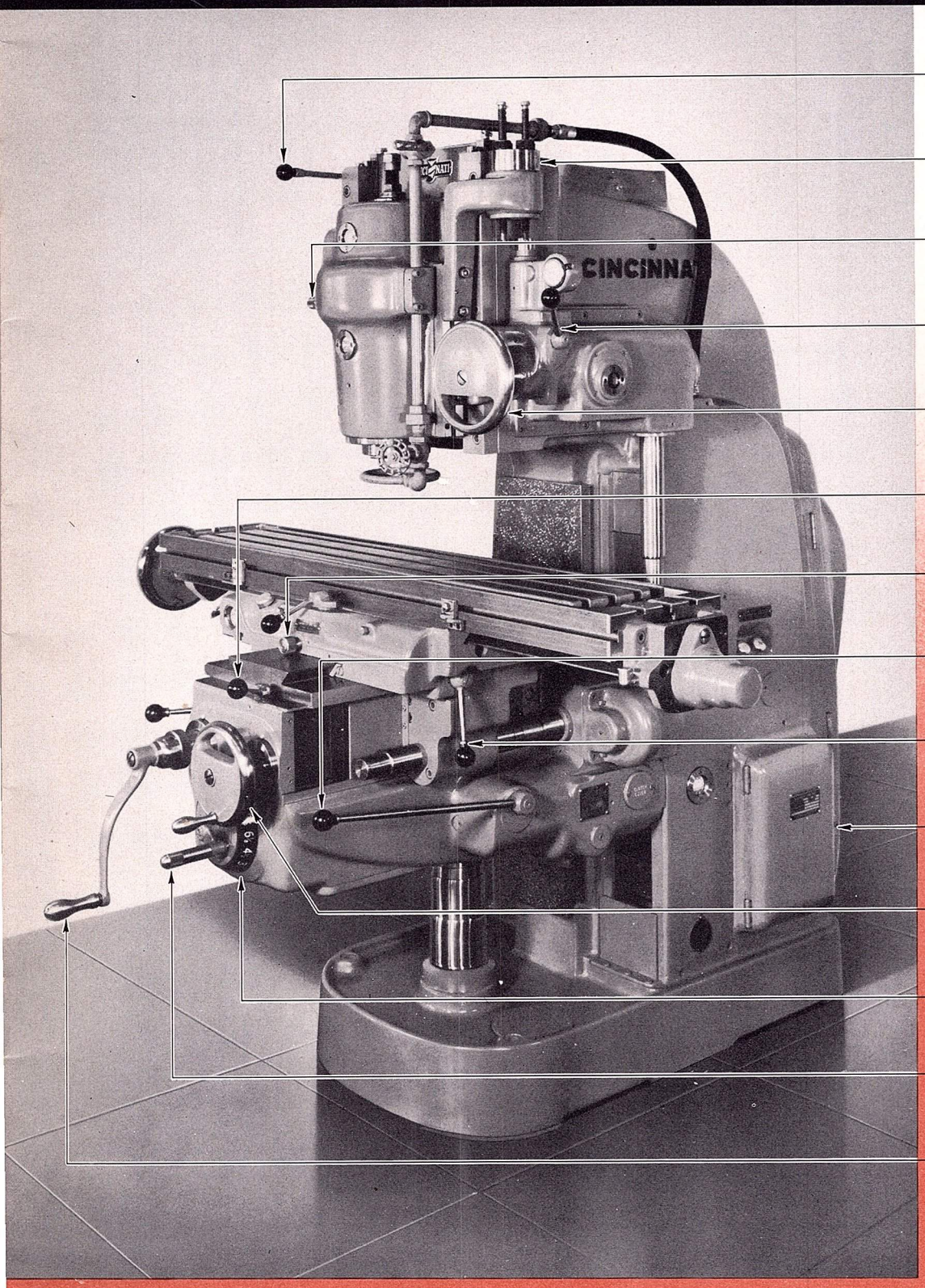
● Its just as easy to change power feeds to the head as it is to change the table feed rate . . . only one-half turn to the right or left of the feed change lever at the front of the knee. The instant power feed or power rapid traverse is engaged, the manual control handwheel kicks out of engagement, protecting the operator.

Power rapid traverse is available for the vertical head, at the rate of 75 inches per minute. This feature is a time saver in retracting the head at the end of boring cuts, or when quick changing collets.



AN INDEX TO OPERATING CONTROLS
Nos. 2ML AND 2MI PLAIN

Nos. 2ML and 2MI MILLING MACHINES



STARTING LEVER

FOUR POSITION TURRET STOP

BACK GEAR SHIFTING LEVER

POWER FEED ENGAGING LEVER FOR VERTICAL HEAD

VERTICAL HEAD HANDWHEEL

CROSS FEED ENGAGING LEVER

*BACKLASH ELIMINATOR KNOB

RAPID TRAVERSE LEVER

SADDLE CLAMP

ELECTRICAL CONTROL COMPARTMENT

CROSS TRAVERSE HANDWHEEL

FEED DIAL

FEED CHANGE CRANK

VERTICAL TRAVERSE HAND CRANK

*EXTRA COST

AN INDEX TO OPERATING CONTROLS
No. 2MI VERTICAL

GENERAL SPECIFICATIONS

SIZE and STYLE		No. 2ML Plain	No. 2ML Universal
TABLE	Working surface	49″x9½″	49″x9½″
	Size over all	52¾″x9½″	52¾″x9½″
	T-slots, number and size	Three—$1\frac{1}{16}$″	Three—$1\frac{1}{16}$″
	Distance between T-slots	$2\frac{5}{16}$″	$2\frac{5}{16}$″
	Swivels, forward and back (Universal Only)	.....	45°
RANGE	Longitudinal	28″	28″
	Cross	10″	10″
	Vertical	17″	16″
	Centerline spindle to top of table:		
	Maximum	17″	16″
	Minimum	0″	0″
	Face of column to brace	$22\frac{1}{16}$″	$22\frac{1}{16}$″
SPINDLE	Standard milling machine spindle nose	No. 50	No. 50
	Diameter of nose	$5\frac{1}{16}$″	$5\frac{1}{16}$″
	Diameter hole for draw-in bolt	1⅛″	1⅛″
	Spindle speeds { Number	16	16
	Spindle speeds { Range	25-1500 rpm	25-1500 rpm
	25, 33, 43, 56, 76, 100, 130, 168, 225, 295, 385, 500, 680, 895, 1160, 1500 rpm.		
	Low range of spindle speeds, 20 to 1200 rpm, or high range of spindle speeds, 33 to 2000 rpm, may be obtained at the time the order is placed.		
	Reverse	Included	Included
FEED	Number of feeds	16	16
	Range, inches per minute { Longitudinal	¼″ to 30″	¼″ to 30″
	Range, inches per minute { Cross	¼″ to 30″	¼″ to 30″
	Range, inches per minute { Vertical	⅛″ to 15″	⅛″ to 15″
	Longitudinal and cross—¼, $\frac{5}{16}$, $\frac{7}{16}$, ⅝, ⅞, 1¼, 1¾, 2⅜, 3¼, 4½, 6⅛, 8⅜, 11½, 16, 22, and 30. Vertical rates are one-half the foregoing.		
	An optional feed range of ½″ to 60″ per minute can be supplied at the time the order is placed. Longitudinal, cross, and vertical feed rates are then in the same proportion as standard.		
POWER RAPID TRAVERSE Inches per minute (Spindle running or stopped)	Longitudinal	150″	150″
	Cross	150″	150″
	Vertical	75″	75″
DIVIDING HEAD	Nominal size	.....	10″
	Actual swing	.....	10½″
	Taper hole in spindle	.....	No. 10 B & S
	Maximum length of work	.....	28″
	Distance from table to end of spindle (when spindle is vertical)	.....	10½″
	Swivel range of head	.....	145°
OVERARM Dynapoise	Distance from underside to centerline of arbor	6⅛″	6⅛″

No. 2ML MILLING MACHINES

GENERAL SPECIFICATIONS

SIZE and STYLE		No. 2ML Plain	No. 2ML Universal
DRIVE	Number of V-belts	3	3
	Pulley speed	750 rpm	750 rpm
	Motor	3 hp	3 hp
FLOOR SPACE	Area	97″x81¼″ 55 sq ft	97″x81¼″ 55 sq ft
COOLANT PUMP (included)	Capacity at nozzle	2 gallons	2 gallons
SHIPPING WEIGHTS AND DATA (Enclosed multiple "V" belt drive, including motor)	Net weight	3,635 lbs	3,835 lbs
	Gross weight, domestic	4,235 lbs	4,435 lbs
	Gross weight, export	4,535 lbs	4,735 lbs
	Size of case	72″x68″x40″	72″x68″x40″
	Cubical contents	114 Cubic Feet	114 Cubic Feet
CODE NAMES		MLPLA	MLUNI

STANDARD EQUIPMENT SUPPLIED WITH THE MACHINE

PLAIN and UNIVERSAL

Complete electrical equipment for 50 or 60 cycle, 2 or 3 phase, 220 to 550 volts AC and wired in accordance with "Machine Tool Electrical Standards".

Motor: 3 hp., open, normal torque, normal starting current, NEMA frame, ball bearing.

Control: full voltage magnetic starter with overload and under-voltage protection including transformer and push buttons operated at 110 volts.

Disconnect switch: a non-fusible type is supplied.

PLAIN

Two Arbor Supports:

One Outer Style "B" with 2⅜″ adjustable arbor bushing provided with lugs for brace.

One Style "A" with adjustable arbor bushing for pilot end arbors. (Also used to support outer end of Universal Spiral Milling Attachment.)

Overarm Brace.

Coolant Pump.

Adjustable Arbor Tightening Rod . . . Wrenches.

Standard Feed Range, ¼″ to 30″ per minute.

Rear Power Feed Control—longitudinal only.

UNIVERSAL

Standard 10″ Universal Dividing Head Equipment, including tailstock with 2-point adjustable center; steady rest; one plate for indexing through 40 to 1 reduction—all numbers up to and including 60, all even numbers and those divisible by 5 up to 120, and many beyond; one plate for direct indexing; one center for headstock; and provision for connecting head to enclosed driving mechanism segment.

Enclosed Driving Mechanism Segment, including change gears for spiral milling, leads range from 2½″ to 100″ (only) for Standard Universal Dividing Head.

Two Arbor Supports:

One Outer Style "B" with 2⅜″ adjustable arbor bushing and provided with lugs for brace.

One Style "A" with adjustable arbor bushing for pilot end arbors. (Also used to support outer end of Universal Spiral Milling Attachment.)

Overarm Brace . . . Adjustable Arbor Tightening Rod . . . Coolant Pump . . . Wrenches.

Standard Feed Range, ¼″ to 30″ per min.

Rear Power Feed Control; longitudinal only.

CINCINNATI

Cincinnati

GENERAL SPECIFICATIONS

SIZE and STYLE		No. 2MI Plain	No. 2MI Universal	No. 2MI Vertical
TABLE	Working surface	49″ x 10″	49″ x 10″	49″ x 10″
	Size over all	52¾″ x 10″	52¾″ x 10″	52¾″ x 10″
	T-Slots, number and size	Three–1 1/16″	Three–1 1/16″	Three–1 1/16″
	Distance between T-slots	2 5/16″	2 5/16″	2 5/16″
	Swivels, forward and back (Universal Only)	.....	45°	.....
RANGE	Longitudinal	28″	28″	28″
	Cross	10″	10″	12″
	Vertical	19″	18″	14″
	Horizontal Machines — Centerline spindle to top of table: Max.	19″	18″	.....
	Horizontal Machines — Min.	0″	0″	.....
	Horizontal Machines — Face of column to brace	22 11/16″	22 11/16″	.....
	Vertical Machines — Spindle nose to top of table: Max.	.....	.....	20″
	Vertical Machines — Min.	.....	.....	2″
	Vertical Machines — Throat distance, centerline of spindle to column	.....	.....	14″
	Vertical Machines — Head travel	.....	.....	4″
SPINDLE	Standard milling machine spindle nose	No. 50	No. 50	No. 50
	Diameter of nose	5 1/16″	5 1/16″	5 1/16″
	Diameter hole for draw-in bolt	1 1/8″	1 1/8″	1 1/8″
	Spindle speeds — Number	16	16	16
	Spindle speeds — Range	25–1500 rpm	25–1500 rpm	25–1500 rpm
	25, 33, 43, 56, 76, 100, 130, 168, 225, 295, 385, 500, 680, 895, 1160 1500 rpm			
	Low range of spindle speeds, 20 to 1200 rpm or high range of spindle speeds, 33 to 2000 rpm may be obtained at the time the order is placed.			
	Reverse	Included	Included	Included
FEED	Number of feeds	16	16	16
	Range, inches per minute — Longitudinal	¼″ to 30″	¼″ to 30″	¼″ to 30″
	Range, inches per minute — Cross	¼″ to 30″	¼″ to 30″	¼″ to 30″
	Range, inches per minute — Vertical	⅛″ to 15″	⅛″ to 15″	⅛″ to 15″
	Range, inches per minute — Vertical head	.....	.....	⅛″ to 15″
	Longitudinal and cross—¼, 5/16, 7/16, ⅝, ⅞, 1¼, 1¾, 2⅜, 3¼, 4½, 6⅛, 8⅜, 11½, 16, 22 and 30. Vertical rates are one-half the foregoing.			
	An optional feed range of ½″ to 60″ per minute can be supplied at the time the order is placed. Longitudinal, cross and vertical feed rates are then in the same proportion as standard.			
POWER RAPID TRAVERSE Inches per minute (Spindle running or stopped)	Longitudinal	150″	150″	150″
	Cross	150″	150″	150″
	Vertical	75″	75″	75″
	Vertical head (Vertical only)	.....	.....	75″
DIVIDING HEAD	Nominal size	.....	10″	.....
	Actual swing	.....	10½″	.....
	Taper hole in spindle	.....	No. 10 B&S	.....
	Maximum length of work	.....	28″	.....
	Distance from table to end of spindle (when spindle is vertical)	.....	10½″	.....
	Swivel range of head	.....	145°	.....

No. 2MI MILLING MACHINES

GENERAL SPECIFICATIONS

SIZE and STYLE		No. 2MI Plain	No. 2MI Universal	No. 2MI Vertical
OVERARM Dynapoise	Distance to centerline of arbor	6⅛"	6⅛"	
DRIVE	Number of V-belts	4	4	4
	Pulley, speed	750 rpm	750 rpm	750 rpm
	Motor	5 h.p.	5 h.p.	5 h.p.
FLOOR SPACE	Area	97"x83¼" 56 sq. ft.	97"x83¼" 56 sq. ft.	97"x86" 58 sq. ft.
COOLANT PUMP (Included)	Capacity at nozzle	2 gallons	2 gallons	2 gallons
SHIPPING WEIGHTS AND DATA (Enclosed multiple "V" belt drive)	Net weight	4,625 lbs.	4,905 lbs.	5,125 lbs.
	Gross weight, domestic	5,275 lbs.	5,575 lbs.	5,825 lbs.
	Gross weight, export	5,575 lbs.	5,875 lbs.	6,175 lbs.
	Size of case	72"x70"x44"	72"x70"x44"	78"x70"x44"
	Cubical contents	129 cu. ft.	129 cu. ft.	138 cu. ft.
CODE NAMES		MIPAI	MIMOO	MIOOV

STANDARD EQUIPMENT SUPPLIED WITH MACHINE

PLAIN, UNIVERSAL, VERTICAL

Complete electrical equipment for 50 or 60 cycle, 2 or 3 phase, 220 to 550 volts AC and wired in accordance with "Machine Tool Electrical Standards".

Motor: 5 hp., open, normal torque, normal starting current, NEMA frame, ball bearing.

Control: full voltage magnetic starter with overload and undervoltage protection including transformer and push buttons operated at 110 volts.

Disconnect switch: a non-fusible type is supplied.

UNIVERSAL

Standard 10" Universal Dividing Head Equipment, including tailstock with 2-point adjustable center; steady rest; one plate for indexing through 40 to 1 reduction—all numbers up to and including 60, all even numbers and those divisible by 5 up to 120, and many beyond; one plate for direct indexing; one center for headstock; and provision for connecting head to enclosed driving mechanism segment.

Enclosed Driving Mechansim Segment, including change gears for spiral milling, leads range from 2½" to 100" (only) for Standard Universal Dividing Head.

Two Arbor Supports:

One Outer Style "B" with 2⅛" adjustable arbor bushing and provided with lugs for brace.

One Style "A" with adjustable arbor bushing for pilot end arbors. (Also used to support outer end of Universal Spiral Milling Attachment.)

Overarm Brace . . . Adjustable Arbor Tightening Rod . . . Coolant Pump . . . Wrenches.

Standard Feed Range, ¼" to 30" per min.

Rear Power Feed Control; longitudinal only.

PLAIN

Two Arbor supports:

One Outer Style "B" with 2⅛" adjustable arbor bushing provided with lugs for brace.

One Style "A" with adjustable arbor bushing for pilot end arbors. (Also used to support outer end of Universal Spiral Milling Attachment.)

Coolant Pump . . . Overarm Brace.

Adjustable Arbor Tightening Rod . . . Wrenches.

Standard Feed Range, ¼" to 30" per min.

Rear Power Feed Control; longitudinally only.

VERTICAL

Adjustable Arbor Tightening Rod . . . Wrenches.

Coolant Pump.

Power Feed and Power Quick Traverse to the Vertical Head.

Standard Feed Range, ¼" to 30" per minute.

Turret Stop, four-position with dial indicator.

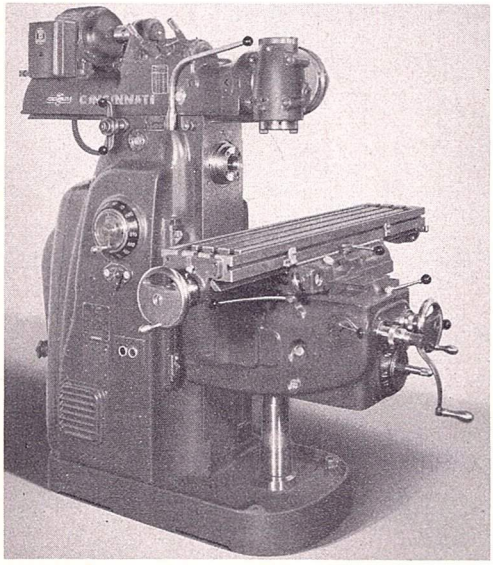
Rear Power Feed Control—longitudinally only.

EQUIPMENT SUPPLIED AT EXTRA COST

Not Included in Price of Standard (Basic) Machine

Nos. 2ML and 2MI PLAIN

1. Electrical Equipment to meet Automotive Standards (includes totally enclosed motors).
2. Electrical Equipment for DC.
3. Electrical Equipment for 25 cycle AC.
4. Automatic Backlash Eliminator. Supplied at factory only. Code Name—MILIM.
5. Rear Hand Adjustments and Rear Power Feed Controls; cross and vertical. Supplied at factory only. Code Name—MIADJ.
6. Standard 10″ Universal Dividing Head and Equipment, including tailstock with 2-point adjustable center; steady rest; one plate for indexing through 40 to 1 reduction—all numbers up to and including 60, all even numbers and those divisible by 5 up to 120, and many beyond; one plate for direct indexing; one center for headstock and provision for connecting head to enclosed driving mechanism segment. Code Name—HUTER.
7. Enclosed Driving Mechanism Segment, including change gears for spiral milling, leads ranging from 2½″ to 100″ (only) for Standard Universal Dividing Head. Code Name—DREHM.
8. Wide Range Divider (applied to Standard Universal Dividing Head) for divisions from 2 to 400,000, hundreds of them exact and others compensated for the fractional remainder.
9. Arbor Support, Inner Style "B", with 2⅛″ adjustable arbor bushing and *without* lugs for brace. Code Name —ARBGI.
10. Vises, Chucks and Chuck Adapters.
11. Arbors, Adapters, Collets, Quick Change Adapters, etc.
12. Standard Attachments: High-Speed Universal, Heavy Vertical, Universal Spiral, Rack Milling, Slotting, Circular Milling, Cam Milling, High Number Indexing Attachment for Dividing Head, Spiral Milling Head, etc.
13. Raising Blocks, Right Angle Plates.
14. Precision Measuring Equipment. Must be applied at the factory.



Motor Driven Universal Milling Overarm Attachment

Nos. 2ML and 2MI MILLING MACHINES

EQUIPMENT SUPPLIED AT EXTRA COST

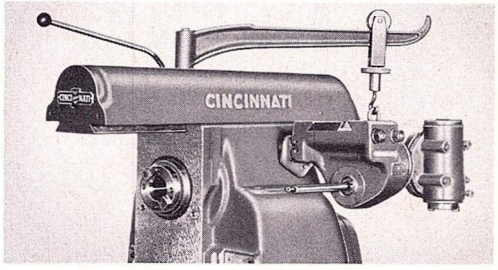
Not Included in Price of Standard (Basic) Machine

Nos. 2ML and 2MI UNIVERSAL

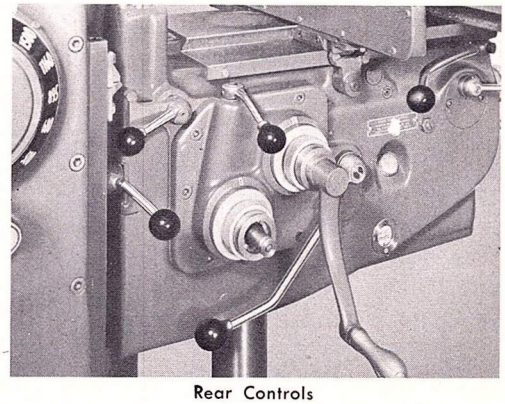
1. Electrical Equipment to meet Automotive Standards (includes totally enclosed motors).
2. Electrical Equipment for DC.
3. Electrical Equipment for 25 cycle AC.
4. Automatic Backlash Eliminator. Supplied at factory only. Code Name—MIASH.
5. Rear Hand Adjustments and Rear Power Feed Controls; cross and vertical. Supplied at factory only. Code Name—MIAND.
6. Arbor Support, Inner Style "B", with 2⅛" adjustable arbor bushing and *without* lugs for brace. Code Name —ARBGI.
7. Low Lead Range from ⅛" to 100", secured with 1 to 20 reducing gear segment applied to Standard Universal Dividing Head enclosed driving mechanism segment. Supplied at factory only. Code Name—DREMI.
8. Wide Range Divider (applied to Standard Universal Dividing Head) for divisions from 2 to 400,000, hundreds of them exact and others compensated for the fractional remainder.
9. Vises, Chucks and Chuck Adapters.
10. Arbors, Adapters, Collets, Quick Change Adapters, etc.
11. Standard Attachments: High-Speed Universal, Heavy Vertical, Universal Spiral, Rack Milling, Slotting, Circular Milling, Cam Milling, High Number Indexing Attachment for Dividing Head, Spiral Milling Head, etc.
12. Raising Blocks, Right Angle Plates.
13. Precision Measuring Equipment. Must be applied at the factory.

No. 2MI VERTICAL

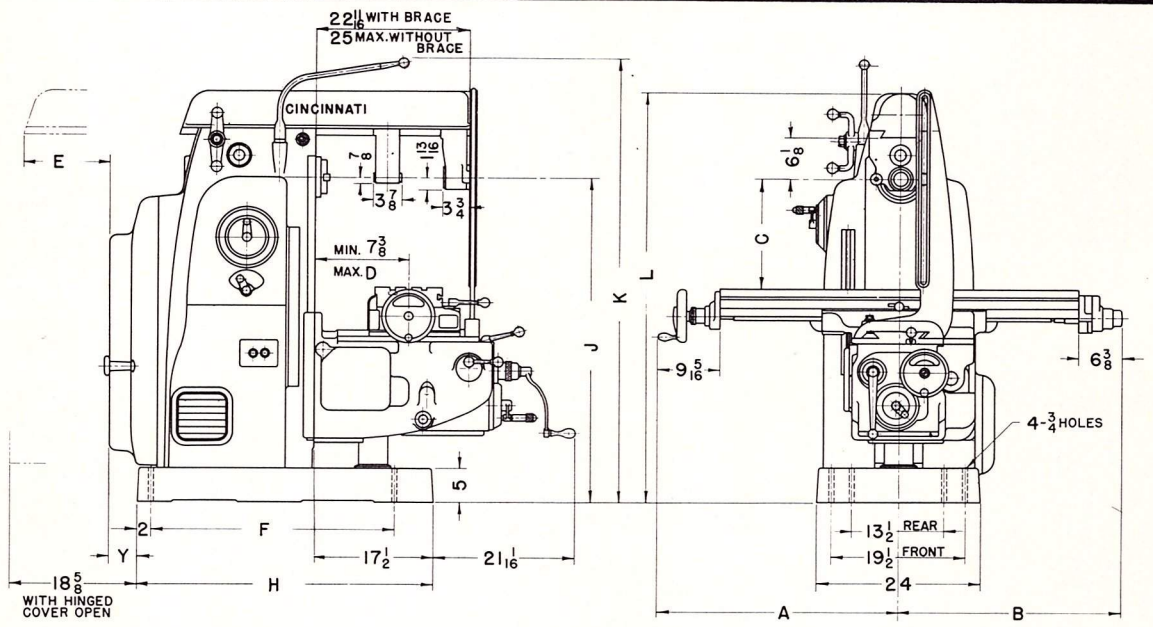
1. Electrical Equipment to meet Automotive Standards (includes totally enclosed motors).
2. Electrical Equipment for DC.
3. Electrical Equipment for 25 cycle AC.
4. Rear Hand Adjustments and Rear Power Feed Controls—Cross and Vertical, supplied at factory only. Code Name—MIREA.
5. Automatic Backlash Eliminator. Supplied at factory only. Code Name—MIBAC.
6. Circular Milling Attachment, Index Bases, Vises, etc.
7. Shell End Mill Arbors, Adapters, Collets, Quick Change Adapters, etc.
8. Precision Measuring Equipment. Must be applied at the factory.

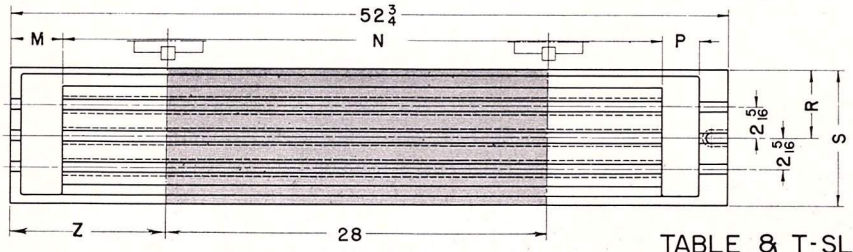


High Speed Universal Milling Attachment with Crane



Rear Controls





SHADED SURFACE INDICATES MAXIMUM CUTTING AREA

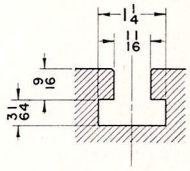
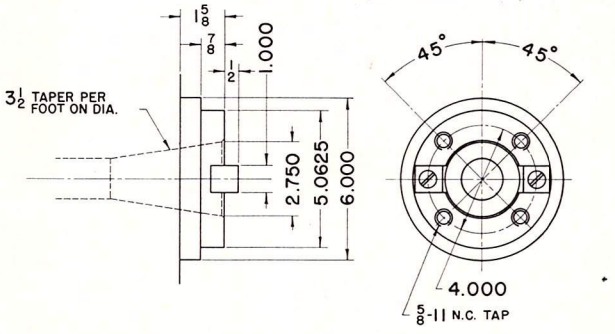
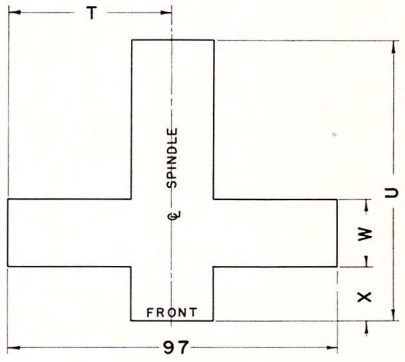


TABLE & T-SLOT



SPINDLE NOSE
STANDARD FLANGED END WITH NO. 50 SERIES TAPER

PC-1982



FLOOR PLAN

Size and Style	A Max.	A Min.	B Max.	B Min.	C Max.	C Min.	D Without Brace	D With Brace	E	F	H	J	K
No. 2ML { Plain	48 13/16	20 13/16	47 1/8	19 1/8	17	0	17 3/8	14 1/4	16 1/2	33 3/4	41 1/2	46	64 1/4
No. 2ML { Univ	50 5/16	22 5/16	45 5/8	17 5/8	16	0	17 3/8	14 1/4	16 1/2	33 3/4	41 1/2	46	64 1/16
No. 2MI { Plain	48 13/16	20 13/16	47 1/8	19 1/8	19	0	17 3/8	14 1/4	12 1/2	35 3/4	43 1/2	48 1/8	65 7/8
No. 2MI { Univ.	50 5/16	22 5/16	45 5/8	17 5/8	18	0	17 3/8	14 1/4	12 1/2	35 3/4	43 1/2	48 1/8	65 7/8

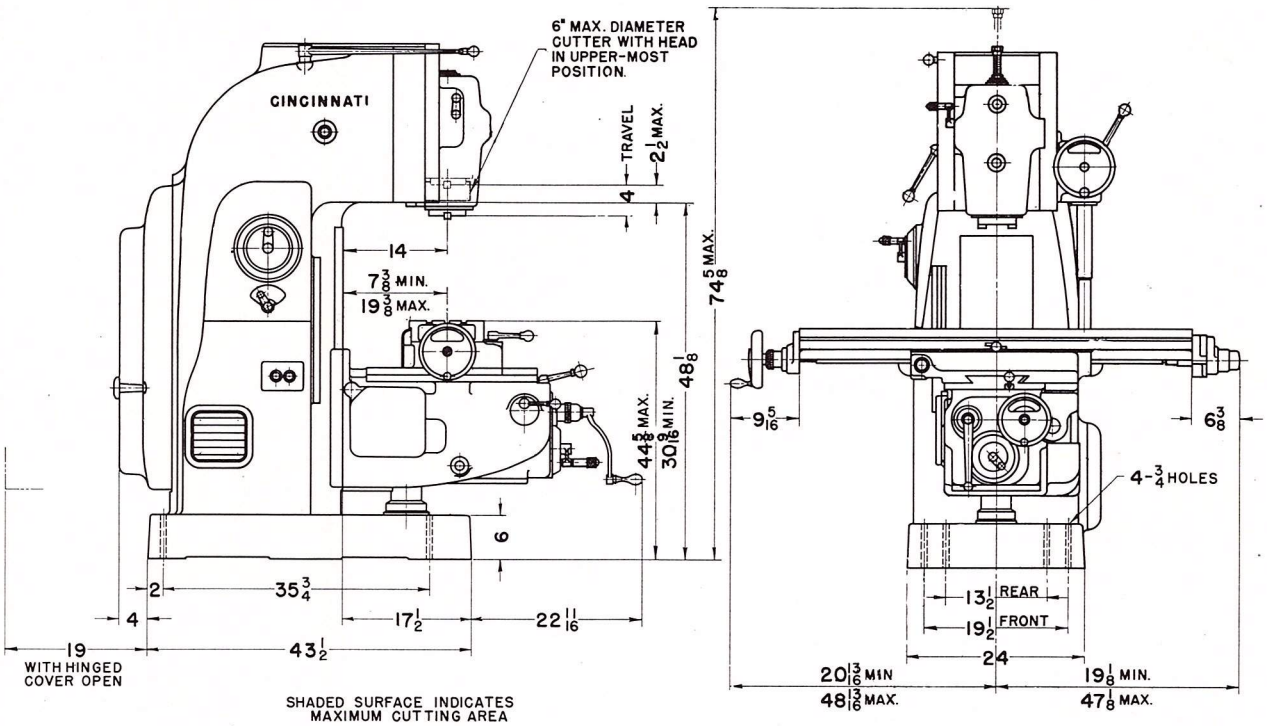
Size and Style	L	M	N	P	R	S	T	U	W	X	Y	Z	
No. 2ML { Plain	58 7/8	3 5/8	44 1/2	2 7/16	4 3/16	9 1/2	48 13/16	81 1/4	19 1/4	16 7/16	2	11 1/2	
No. 2ML { Univ	58 7/8	3 5/8	44 1/2	2 7/16	4 3/16	9 1/2	50 5/16	81 1/4	19 1/4	16 7/16	2	13	
No. 2MI { Plain	60 7/8	3 3/4	44 1/4	2 5/8	5	10	48 13/16	84	20	16 3/16	4	11 1/2	
No. 2MI { Univ.	60 7/8	3 3/4	44 1/4	2 5/8	5	10	50 5/16	84	20	16 3/16	4	13	

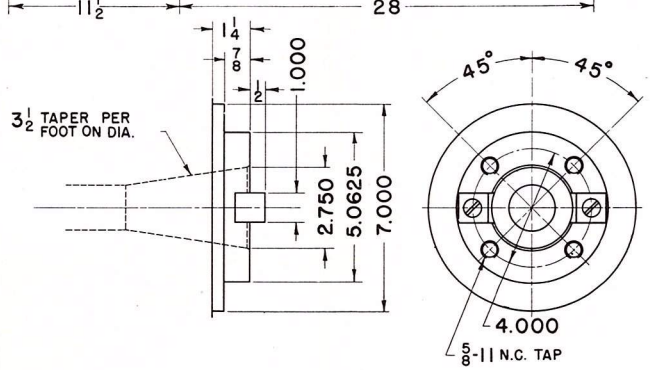
DIMENSIONAL DRAWING

Nos. 2ML and 2MI—Plain and Universal

(All dimensions are in inches)

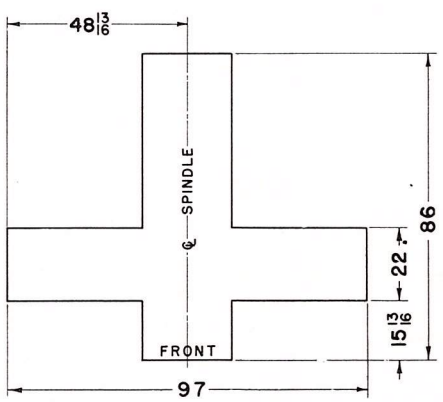
Nos. 2ML and 2MI MILLING MACHINES





SPINDLE NOSE
STANDARD FLANGED END
WITH NO. 50 SERIES TAPER

PC-1983



FLOOR PLAN

DIMENSIONAL DRAWING
No. 2MI Vertical
(All dimensions are in inches)

MILLING MACHINES

BROACHING MACHINES

CUTTER SHARPENING MACHINES

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